

THE STORY
OF CREATION

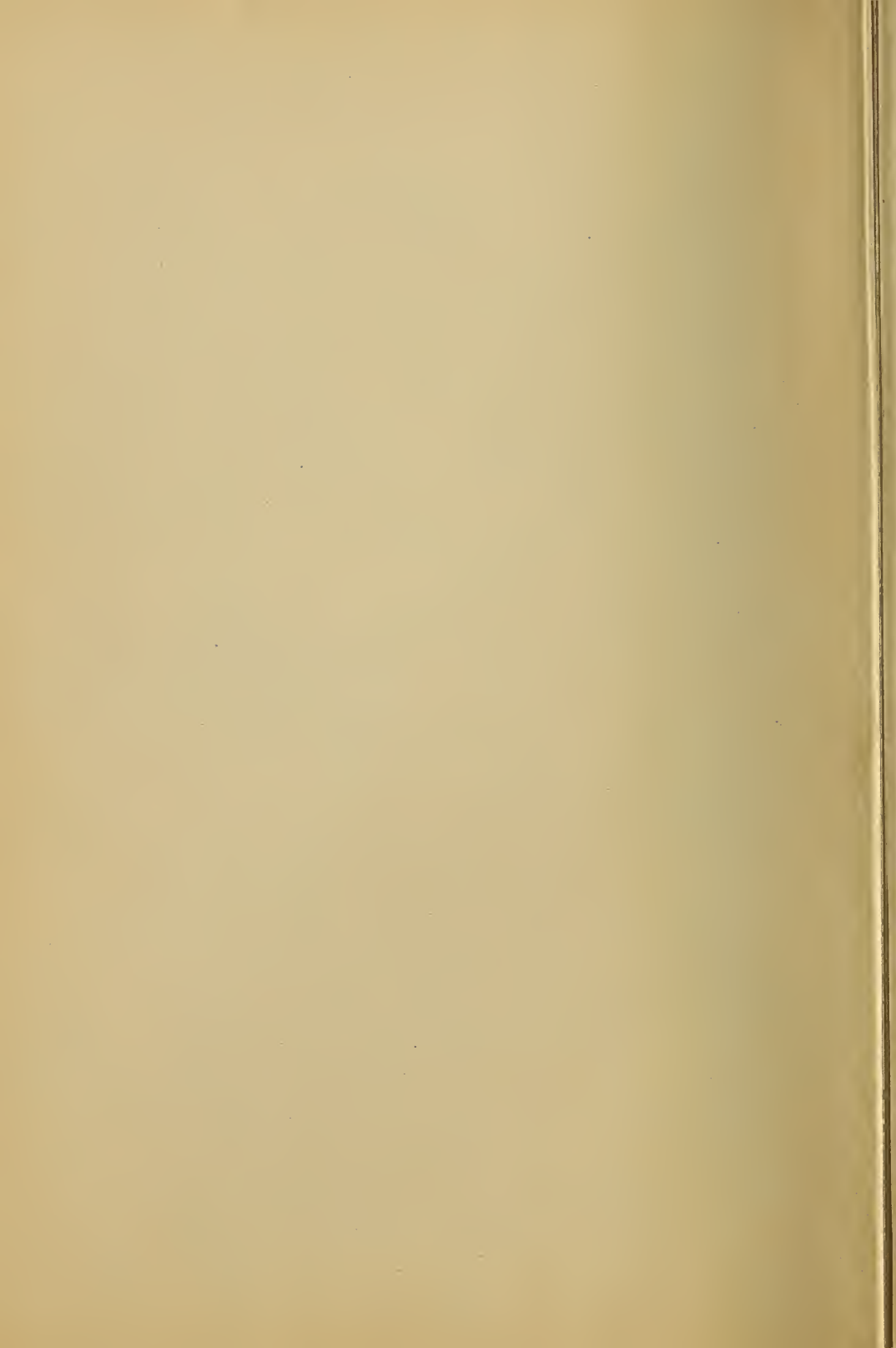
—*—
S. M. CAMPBELL D.D.

LIBRARY OF CONGRESS.

ES651
Chap. Copyright No.

Phelf C3

UNITED STATES OF AMERICA.



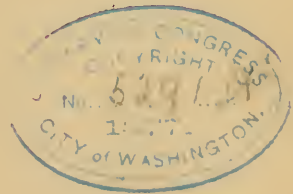
THE ORDER OF CREATION.

THE ERAS.	FORMATIONS.	LIFE.	THE SIX DAYS.						
The Neozoic Era.	Post Tertiary.	Man.							2, Man.
	Glacier.		Glacier.						
	Pliocene. Miocene. Eocene.	Mammalia. Tertiary Animals.							
Mesozoic Era.	Cretaceous. Jurassic. Triassic.	Birds. Reptiles.							
The Palaeozoic Era.	Permian. Carboniferous. Devonian. Silurian. Cambrian.	Batrachian. Amphibian. Fishes. Crustacean. Coral. Mollusk.							
Protozoic Era.	Laurentian Rock.	Animal Life. Vegetation.							
The Azoic Era.	Dry Land. Ocean. Molten Rock.								
Chaos. Eternity.	Nebula.	Space-making. Light. Motion. Darkness. God.							
			I. Day. Light: the nebula in motion becomes luminous.						
			II. Day. The firmament: space-making: the nebula breaks up.						
			III. Day. 1, Dry land; 2, vegetable life. Completes the first triad.						
			IV. The lights: sun, moon, and stars.						
			V. Day. { Marine life; Reptiles; Birds; "Great Whales."						
			VI. Day. 1, Mammals;						

THE
STORY OF CREATION.

BY
S. M. CAMPBELL, D.D.,

AUTHOR OF "ACROSS THE DESERT," ETC.



BOSTON:
LOCKWOOD, BROOKS & CO.

1877.

BS651

C3

COPYRIGHT, 1877,
BY
LOCKWOOD, BROOKS, & CO.

140 25 13 10.5-30.
M. v. g.

PREFACE.

I HAVE a story to tell. It is one that many persons have told before me ; but that is no reason why I should not tell it again. Others have given it in their way, and I give it in mine. Theirs may, in most respects, be the better way ; and yet I may say some things which they have omitted, or possibly gain the attention of some persons who would not listen to a more elaborate effort, or to one made with a greater show of learning. My treatise is a brief one, and offered with little pretense ; and yet, I have seen the time myself when I would have been glad to find, anywhere, just such a simple and easily understood rendering of this great subject as will be found in these pages. It is not enough to write for scholars ; the story of creation is beginning to interest a large class of plain, unlearned men.

I offer great latitude here to the speculations of modern science. This will not strike all my readers favorably ; but time, I think, will justify the course I have taken. I have lived to see the nebular hypothesis propounded, disputed, and at last quite generally accepted. The development hypothesis seems passing the same ordeal. It has not yet, by any means, been established,—but it is every year gaining ground with scientific men ; and the question is already upon us, whether, in case that hypothesis were established, we could maintain our faith in the Bible. Some scientific men say no ; some zealously religious men say no. Others, equally wise and equally good, say yes : the Mosaic cosmogony and the development hypothesis may be so interpreted as to stand in perfect harmony. In this work I take my stand with the latter class, and make my appeal to all honest inquirers and earnest workers, whether in the field of biblical interpretation or in that of scientific research. Whether we read from the rock-record or from the inspired Word, the story of creation is essentially the same.

S. M. C.

CONTENTS.

CHAPTER I.

- An ancient document — Moses: what he wrote: what he claimed — Modern science:
 conflict with Moses — The reconciliation - - - - - 9

CHAPTER II.

- The Creator: his name — In the plural — In the singular — Names indicate nature —
 God's nature a plurality — The Trinity - - - - - 13

CHAPTER III.

- Creation: what was it? — The heaven: one God — Eons and Demiurges — Creation
 absolute — Bara': asa: tadshe - - - - - 18

CHAPTER IV.

- Mind and matter: which was first? — Self-existence — Mind superior to matter —
 Matter had a beginning — Matter and force - - - - - 23

CHAPTER V.

- The beginning: when was it? — The date "4,004 B. C." — The old writers — Tally-
 sticks — The Genesee River: the rock it has cut through - - - - - 28

CHAPTER VI.

- Tohu and bohu — Primeval matter: a nebula — Prof. Tayler Lewis — Moses' record:
 remarkable coincidence — Darkness - - - - - 33

CHAPTER VII.

- The other record: does it agree? — The nebular hypothesis — Evidence from the
 planets — Still existing nebulae — Prof. Alexander - - - - - 37

CHAPTER VIII.

- A world on fire — Water and steam — Internal heat of the globe — Volcanoes — Igneous
 rock — The poles flattened — Another fire - - - - - 42

CHAPTER IX.

- A chaos of boiling seas — The cold of the spaces — The cloud-wrapping — The age of
 storm — Chaos three-fold - - - - - 46

CHAPTER X.

- Maherepheth: the brooding — Order of writing — The waters — Not the wind — Mo-
 tion — Prof. Tyndal's "potencies" — Natural law - - - - - 52

CHAPTER XI.

- Let there be light — Division of the verses — God "said" — A luminous nebula —
 Clouds breaking — Dark and light nebulae — Prof. Mitchell — Light before the sun
 — The angels' shout — Day - - - - - 59

CHAPTER XII.

- The light a blessing — A world of blind men — Vegetation — A tonic — Color — Things
 afar — Light-houses — The telescope — The spectroscope — Joy - - - - - 64

CHAPTER XIII.

- The creative day: evening and morning—Solar days—The “obvious meaning,”
Tyndal—Translators—Dr. Murphy’s reading—Not a day-measure - - - 72

CHAPTER XIV.

- The creative day: confirmatory—Several meanings here—No other allusion to it in
the Bible—Overlapping of the days—The first day - - - - - 77

CHAPTER XV.

- Argument from the seventh day—How long since creation ceased?—No evening—
All that in them is—The fossils - - - - - 82

CHAPTER XVI.

- Objections—Why not before?—Where are your “six” epochs?—The fourth com-
mandment: God’s days and man’s—Clock-time - - - - - 86

CHAPTER XVII.

- The firmament—God and nature: the supernatural—Firmamentum: the rakah—
Bad translations—Moses’ exact statements - - - - - 91

CHAPTER XVIII.

- Space-making—The nebula breaking up—Professor Guyot—The process—Sublime
spectacle - - - - - 96

CHAPTER XIX.

- Another view: the atmosphere—A double concord—Cloud-masses: ocean—Prof.
Waring: “not good”—Balloon ascent: peril - - - - - 100

CHAPTER XX.

- The uses of the atmosphere—A London fog—Hearing—Atmospheric pressure—
Perfume: Joppa oranges—Respiration: oxygen—The blood—Professor Dalton 105

CHAPTER XXI.

- The atmosphere as a water-carrier—Watering the earth—Evaporization—Motion of
the air—William Arnot—Cloud-making—Moist air—Blue sky: sunsets - - 111

CHAPTER XXII.

- The name he gave it—Heaven—How high—The starry heaven: a million—The
third heaven—Where is it?—Maedler of Dupal—Alcyone—The sea of glass:
calm - - - - - 118

CHAPTER XXIII.

- The third day—Under water—The two triads compared—Evidences of universal
ocean: sea-shells on dry land—Moses anticipates geology—A flood long before
Noah - - - - - 124

CHAPTER XXIV.

- Let the dry land appear—Natural agencies—St. Augustine—Nantucket—Temple
at Puzzuoli—These changes once on a large scale—Not in one solar day - - 129

CHAPTER XXV.

- The contour of the continents—God and nature: the eye—Three continental masses
—Double masses—Rocky points—Bent on the west side—Guyot—Steffens—
Mountains—Rivers—Cities—History - - - - - 134

CHAPTER XXVI.

- The origin of life—Spontaneous generation: room for it—Nothing full-grown—
Interpositions—The “plant before it grew”—Dr. Murphy—Professor Bush—
The passage wrong end foremost - - - - - 141

CHAPTER XXVII.

Moses and Mr. Darwin — Unnecessary conflict — Galileo — Leibnitz' mistake — Darwin: germs — The doors open — Limits to Darwin's theory — President Anderson — Professor Tyndal: his recognition of God — President Potter — Dr. McCosh — Dr. Brown - - - - - 146

CHAPTER XXVIII.

Grass, herb, and fruit-tree — The system of Linnæus: not here — The kinds not necessarily simultaneous — Vegetable life first — Dr. Dawson — Professor Dana — By topics — Side by side — The anthem - - - - - 154

CHAPTER XXIX.

The noonday of vegetation — Luxuriance — Carbon — Moisture — Heat — Great ferns and mosses — Coal-pits — Remains in coal mines — Light, heat, and energy stored up — Professor Huxley - - - - - 158

CHAPTER XXX.

The fourth day: sun and moon — A new triad — Perspective: photography — A desolate orb: its great uses — The greater light: spots: corona: the storms — Refrigeration: the sun extinct — Slow process - - - - - 165

CHAPTER XXXI.

Was it a creation? — Dr. Murphy's "appointment" — Hugh Miller — Removal of the earth's photosphere — Guyot — Overlapping of the days — Brightness made alternate — Terrestrial life by periods - - - - - 172

CHAPTER XXXII.

Time-keepers — Signs: agriculture — Inclination of the earth's axis — Importance of time-keeping — Bible and almanac — Amazing accuracy of celestial chronometers 177

CHAPTER XXXIII.

The stars also — What were "the stars"? — Different kinds — Deck-watches — Planets: comets: meteors — Meteoric stones — British museum — Meteorites and comets: analogy - - - - - 184

CHAPTER XXXIV.

The solar system — The cycles of the planets — The real centre of the system — Copernicus — Newton — Kepler: his enthusiasm — The eight children of the sun — Our own world in the temperate zone — Are the planets inhabited? - - - - - 189

CHAPTER XXXV.

The fixed stars — Real stars — Fixed but not stationary — Great suns — Dr. Burr — Kingcraft — Multitudes — Distance — Measuring by light — Dr. Chalmers — The atonement - - - - - 198

CHAPTER XXXVI.

The star-systems — Apparent grouping: real grouping — Names — Multiple stars — Clusters — Sir John Herschel — Color — Nebulæ — Nebulous stars — Islands — God and nature - - - - - 204

CHAPTER XXXVII.

The fifth day — Upward — The spawners — Fowl: flying-thing — Tanninim — The waters — The order of succession: from lower to higher — Bara — Bringing forth — Professor Lewis - - - - - 212

CHAPTER XXXVIII.

The response of nature — Science dumb: a finger pointing — How did Moses know? — Lowly creatures — Fertility of lower animal orders — Poli — Science: the record 218

CHAPTER XXXIX.

The reptiles and the birds—The successive dynasties—Batrachian life—Saurians—
Association with birds—Archæopteryx.—Translations—Geology an interpreter. 222

CHAPTER XL.

The sixth day: its morning—A new race of creatures—Nephesh hayah—Wild beast
—Death and pain before Adam—Prowlers—Milton—Among the mammalia 228

CHAPTER XLI.

The earth-product: its period—Milton's conception—Each "after his kind"—Tay-
ler Lewis—Nature and the supernatural—The period the same as the mammalian
of geology - - - - - 233

CHAPTER XLII.

Neozoic time—Four great periods—Subdivision of the neozoic—Extraordinary fauna
—Cattle, creeping thing, and beast—Carnivora—A prowler—Moses and the
geological succession - - - - - 239

CHAPTER XLIII.

A pause: the ice-age—The break in the story—What is a glacier: its rate of motion
—Duration of the ice-age—Natural cause of it—Its uses—The inclination of the
earth's axis - - - - - 246

CHAPTER XLIV.

A spring-blossom—Breaking-up of winter—The diluvian period—Appearance of
man—The strange beasts he met—Replenishing and subduing - - - - 254

CHAPTER XLV.

Man and beast—Indications of superiority—The formula—Man comes last—The
subject enlarged upon—The creation of the woman—Scientific corroboration - 261

CHAPTER XLVI.

The divine in man—Man's dominion—In the image of God—No animal so made—
The breath of life—Not of the earth, but of God - - - - - 265

CHAPTER XLVII.

From the dust—How from the dust?—A clay form—Through previous generations
—President Potter—Professor Lewis—Professor Winchell—The Bible admits of
derivation - - - - - 270

CHAPTER XLVIII.

Darwinism: not proven—Honorable warfare—Darwin's admissions—The inclined
plane not to be found—The gaps to be filled—The widest gap of all between
monkey and man - - - - - 274

CHAPTER XLIX.

Wanted: living witnesses—A graduated series not necessarily an evolution—Apes
three thousand years ago—Egypt—Alternate development and interposition—
Interpositions the exception - - - - - 278

CHAPTER L.

Primeval man—Was he a savage?—He was primitive—His dress—His treasures—
His actions—Speech—Agriculture—His moral sense—When did he appear—
Hodge—Location - - - - - 284

CHAPTER LI.

His religion and his civilization—The record in nature—A recent creation—A
religious being—Monotheism—The two streams of western migration—Civiliza-
tion close to the old centre - - - - - 289

CHAPTER LII.

The early race and the earlier — Postdiluvian and antediluvian — Paleolithic and neolithic man — Reindeer age — A continental subsidence — Nephilim — Violence - 295

CHAPTER LIII.

Deterioration — Degradation of species — The fall — Emigration — Bushnell — Guyot — The lines of remote emigration - - - - - 301

CHAPTER LIV.

Of one blood — Relation of the doctrine to Christianity — Agassiz and Darwin — Language — Mental unity — Spiritual unity — Depravity — Physiological and anatomical unity — The sketch of the hairy elephant — Surgery - - - - - 306

CHAPTER LV.

How old art thou? — Our Reference Bible — Egypt — The zodiacs — Nile-deposit — Roman pottery - - - - - 313

CHAPTER LVI.

Cave-men — Floods — Kent's Hole: stalagmite — Professor Winchell: Iowa lead-mines — Captain Brome — Gibraltar — "The Nation" — Kentucky flat-boat — Dr. Pfaff - - - - - 319

CHAPTER LVII.

The seventh day — Creation on our planet ended — The rest-season — No new type of life since man — God's work and rest our pattern — Spiritual advantages - - 326

CHAPTER LVIII.

Résumé — Beginning — Chaos — Light — The expanse — Ocean — Vegetation — Ascending scale — Marine life — The tanninim — Sixth day — Eden — The expulsion — The flood - - - - - 331

LIST OF ILLUSTRATIONS.

Frontispiece—Order of Creation.	Saturn - - - - -	194
The Solar System as a Nebula - faces 39	Cluster in Hercules - - - - -	206
Age of Storm - - - - - 49	Ring Nebula - - - - -	208
Temple of Jupiter Serapis - - - 131	Nebulous Star - - - - -	209
A Forest of the Coal Period - faces 159	Hadrosaur - - - - -	223
Found in Coal - - - - - 161	Dinotherium - - - - -	243
A Lunar Crater - - - - - 167	The Gorner Glacier - - - - -	248
A Sun Spot - - - - - 169	Elephas Primogenius, etc. - - -	258
The Earth at the Vernal Equinox - 178	Relative Size of Skulls - - - -	280
General View of a Comet - - - 187	The Original Centre and the Course of	
Venus in its Different Phases - - 192	Migration - - - - -	291
Mars - - - - - 193	Elephant engraved on ivory - - -	311

THE STORY OF CREATION.



CHAPTER I.

AN ANCIENT DOCUMENT.

ABOUT 3,500 years ago, a man sat down to write a history of creation; and that unique and curious production still survives in its original language and form. The writer, according to the notions of those times, was an educated man; but he knew almost nothing of that system of science by which in modern times the same history is revealed. There was no such science as chemistry in his day. Scarcely was there any such thing as astronomy. And some of the plainest things in comparative anatomy, botany, geology, and physics, had not yet been dreamed of.

Yet the writer launched out boldly, and told his story, as one who knows the truth and does not fear to challenge contradiction. Of necessity he made his production a brief one; and yet he crowded into it a great number of particulars. He described the condition of things when all these worlds lay formless and void. He outlined in graphic succession the great changes that oc-

curred afterward. He marked the epoch at which life appeared; and having traced this mysterious agency through its successive developments until it culminated in the advent of man, he arrested his narrative, saying that after this creation paused, and God rested from all his work.

This daring author was Moses, the ancient Jewish law-giver; and the document he prepared is to be found in the opening chapters of the Hebrew Bible. He claimed to have received his knowledge on this subject by divine inspiration; and until quite lately, his story has been regarded, wherever known, as the most rational and consistent account of the matters upon which he treats, anywhere to be found. Indeed, the far greater number of those who have well acquainted themselves with this document, have, even to this day, accepted it as the sure word of God.

But of late a story of creation has been made out, from the study of the natural sciences. Astronomy, physics, botany, comparative anatomy, chemistry, and most of all geology, have been interrogated on this subject; and the answers they give, arranged in careful order, have formed a new document, which, in the estimation of some persons, squarely contradicts the old. So, one party has risen to say that the new story can not be true, because, as they believe, it is contrary to the sacred Scriptures; while very naturally another party has risen to say that the Bible is not true, because it gives statements in this matter which are quite opposite to the facts in the case.

This dispute has had one good effect: it has led to a more careful examination of the ancient document, and

to a more accurate interpretation of it, on the one hand, and it has stimulated a more eager study of the volume of Nature on the other; and we are coming to see that the two histories, which were at first thought to be so utterly irreconcilable, are singularly alike. As our knowledge advances, new coincidences between the two appear, some of which are very striking; and, although we have much to learn yet on both sides of this question, we have reached a position from which we may safely declare the essential agreement between the word and the work of God.* The discoveries of modern science are anticipated, in this remarkable document, to such an extent as to furnish an argument, of very great weight, showing that Moses wrote by inspiration of the Holy Ghost. He possessed a knowledge which none of the schools of his time could give. He gave, in outline, the course of creation, so as it is found to have been, by the best and latest scientific researches of this nineteenth century.

It is not unlikely that his story is, in part, a compilation. There may have been traditions which he produced in written form. There may have been brief written documents, handed down from times before the flood. And putting these together under divine guidance, he may have sifted out the truth from them all, and woven it together in his curious narrative. There are some peculiarities in his writings which suggest this view; and we need not hesitate for a moment to accept it; for a man may be as truly inspired to compile a work from existing documents, as to prepare an original composition on the same subject. And if we attempt to cast away this por-

* Dr. Dawson: *Proceedings of Evangelical Alliance*, 1873, p. 272.

tion of sacred Scripture, as unworthy of belief, we may as well prepare our minds to cast away the whole. The first chapter of Genesis and the last chapter of Malachi, the Old Testament Scriptures, and those later writings which are received in the Christian church alone, are to be accepted or rejected together. And, as Jesus once said, "Had ye believed Moses ye would have believed me, for he wrote of me,"* so Moses might now say to those who attempt to cast away his writings while clinging to the New Testament, "Had ye believed Jesus ye would have believed me, for he spake of me."

Jesus always recognized the Jewish Scriptures as of divine authority. To those writings he appealed in his disputes with the Pharisees. On them he based his own high claims as the Messiah. And one of the very last things he said, before ascending unto the Father, was, "All things must be fulfilled which were written in the law of Moses, and in the Prophets, and in the Psalms, concerning me."† Moses, the Prophets, and the Psalms: this was the three-fold division of the Hebrew Bible; and these three Jesus received and held as the Word of God.

* John v. 46.

† Luke xxiv. 44.

CHAPTER II.

THE CREATOR: HIS NAME.

THE document we have been considering opens with these words: "In the beginning God created the heaven and the earth." This material universe, according to the statement, had a Creator. Who is he, and what is his name?

In our English speech we call him God, or, as the word means, the Good One. The Hebrew word from which we translate this term, however, is Elohim, which means The Great or The Strong. And it is a curious circumstance that this term, as it occurs in the story of creation, is in the plural number. A perfectly exact rendering of the passage above quoted therefore would be, "In the beginning the Gods created the heavens and the earth."

This is very remarkable. In this book the doctrine most of all insisted upon is that there is but one God. This doctrine is boldly proclaimed as against the exaggerated polytheism of Egypt. This doctrine is inculcated upon the minds of God's chosen people in every possible manner; and they are forbidden to worship or recognize any other being whatsoever as a true god. And yet in the opening sentence of the narrative, all this teaching seems set at defiance, while in each section of

the story, the fact presents itself again and again that this creative work was done by the Elohim, or the Gods.

To add to this mystery, as the narrative moves on, a new name comes in. We begin in the second chapter, at the fourth verse, to read the *Lord* God, the word *Lord* being printed in capital letters, to indicate that in the original the term is Jehovah. He is called Jehovah Elohim. This is the new name, Jehovah; and this name is as stubbornly of the singular number as the other is of plural form. This is the puzzle: a name for God, which is always found in the plural number, though we are persistently taught that there is but one God; and this name closely conjoined with another which is not only found in the singular number here, but which has no plural form in the Hebrew tongue. Added to this is the circumstance that, with few exceptions, like that in Genesis i. 26, where God says, "Let us make man," the pronouns which stand for this plural name are always in the singular. And added to this is the other circumstance, equally significant, that all the verbs which should agree with this curious nominative, are also in the singular number. So that we find the word God a plural nominative, and "created" a verb in the singular number to agree with it; God, a plural name, and Jehovah, a word that has no plural, joined with it; Elohim implying more than one represented as creating what the book persistently declares to have been made by only one, because there is of such but One. A great contradiction this; what does it mean?

Some hold that the plural number here is simply the *pluralis magistaticus*, the royal style. Kings use the plural

number, and God uses it because he is a king. But one difficulty with this view is, that where God particularly appears as King, he announces himself to the people by the other name.* The supreme word is not Elohim but Jehovah, not the word in plural form but the one in the singular. Moreover, the custom of kings to speak in the plural number is comparatively modern, and certainly had not begun in the time of Moses. "I am Pharaoh," said the great monarch of that day; and even as late as the captivity, the proud king of Babylon speaks in the same manner. "I make a decree,"† says Nebuchadnezzar. The *pluralis magistaticus* had not yet appeared. It is an invention of later times.

Names, as they appear in Scripture, have great significance. They always indicate the nature of a thing; and when names were given to men which did not sufficiently suggest their peculiarities, they were changed or other names were added. Abraham's name was changed in that way; so was Jacob's; and so was Simon Peter's. Therefore where we have a series of names applied to the divine Being, we may naturally suppose that they represent certain peculiarities of his nature. If he is called by one name that always indicates plurality, we may suppose that there is a plurality in his being; and if he is called quite as often by another name, indicating oneness and indivisibility, we may conclude that there is a unity in his being. And if these names are closely conjoined, then we may conclude that his nature embraces both a plurality and a unity; or, in other words, that there is a sense in which he is more than one, and another sense in which he is one only.

* Exodus iii. 14.

† Daniel iii. 29.

What conception of God is there which embraces these peculiarities? Why, clearly this, and this only—the Christian conception of three Persons in one Godhead. There is but one God, Jehovah; but he is the Elohim, the Trinity, subsisting in three Persons, the Father, the Son, and the Holy Ghost. It need not, indeed, at all be maintained on this account that this doctrine of the Trinity is revealed in this early writing; but it may be insisted that the way is left open for it. Nay, more: there are peculiarities in this first verse of the first chapter of Genesis, which find rational explanation in no other way.

There is also an interchange of the divine names in these chapters, deserving some attention. In the first chapter, the divine Being is simply called Elohim, God; and this continues through three verses of the chapter following. But when the next verse is reached, the word Jehovah, *Lord*, is introduced, and we read Jehovah Elohim, *Lord* God. This continues till the close of the third chapter, when the word Elohim is dropped, and we read only Jehovah, *Lord*. This method runs on till we reach the fifth chapter, where the writer returns to the use of the word Elohim, God, as at the beginning.

It is not easy to account for these changes. Perhaps the simplest explanation will be the most nearly correct. It is not impossible that these several ways of mentioning the divine name were simply the several styles of composition peculiar to those writers whose productions Moses has compiled into this narrative. These writers may have been inspired persons; or, though uninspired, Moses by inspiration may have selected and arranged their writings so as would give us, in its best form, the

history he would relate. Possibly we have here fragments of authorship far more ancient than the time of Moses. We do not know how early men learned to write, and here may be words traced first by Noah in the ark, by Enoch before God took him, by Abel, or by Adam himself. Moses may have used these documents, if such there were, by divine direction, in making up his history, retaining the language and style of each writer from whom he gathered his materials. To some persons this will be an unwelcome suggestion. To give up the idea that Moses wrote this book as an original composition, dictated to him by God, will seem to them like giving up our belief in his inspiration. But not so. The faith we have in this book does not depend upon the question who wrote it, or in what way it was put together ; but upon the fact that both our Saviour and his apostles distinctly recognized it as the Word of God.

CHAPTER III.

CREATION : WHAT WAS IT ?

“**I**N the beginning God created the heaven and the earth :” what was this act of creation ; and how much is included in the words “the heaven and the earth” ?

The word heaven in this passage, as it stands in the original Hebrew, is in the dual construction : that is, it signifies two heavens, or the double heaven. The word refers to the apparent blue vault above the earth, and the corresponding vault under the earth. These two vaults, constituting a hollow sphere, phenomenally encompass our world ; and the statement is that God created this hollow sphere and also the solid world on which we dwell. What that sphere may be, Moses does not yet say ; nor indeed what may be the shape or the constitution of this solid world. The blue sky may be either a solid vault or an open expanse. This world may be either a broad plain or a rolling ball. On these points he in no way commits himself, in the general statement above quoted. But, of one thing he makes positive affirmation—God created this world and those skies around it. Whatever they embrace is the work of his hand. In more modern speech, therefore, his statement would be that God at the

beginning created the entire material universe. The terms heaven and earth, in the mouth of a Hebrew, signified everything. And what is here declared is well paraphrased by the evangelist when he says, "All things were made by him, and without him was not anything made that was made." *

It was the design of Moses, apparently, in making this statement, to exclude the idea that any being, except the one true God, performed any part of this creative work. And the motive for this precaution may be discovered in the prevalent polytheism of the age when this history was prepared. One of the worst errors into which men fell, after the apostasy, was the multiplying of objects of worship. As they lost their love for the true God, they began setting up for themselves rival deities with whom he should share his honors. This proved a source of corruption. As it sprang from the depraved heart, so its tendencies were always degrading. Gods of human invention were much the same sort of beings as their inventors — passionate, selfish, unjust, impure ; and the rites in which their worship was celebrated, were in no way calculated to elevate men, but often to degrade them. This was polytheism : a religion that debased its votaries, and that dishonored the true God. And in Egypt at least, where Moses was educated, this religion was thoroughly established, and was exaggerated to its utmost extreme.

Moreover, it was a peculiarity of all polytheism, to begin with some idea of cosmogony, or world-making. Where it prevailed, people had no idea of one God who created all things, but conceived of an inferior class of beings,

* John i. 3.

Eons and Demiurges, who built upon the great fabric, and joined their powers to put it in shape. And, as a consequence, honors were paid to these imaginary beings which were due to God alone. The beautiful volume of Nature, every line of which was written by the divine hand, was ascribed to other and inferior authorship, and God was thus robbed of the honor of his own work.

Against this Moses set this statement of the facts of creation, in stern array. His narrative is one solemn protest against that form of religion which so dishonors God. And in this opening sentence of his story he aims a thunderbolt at the head of the monster whom he would destroy. There is one God, he says, and only one. It is the same voice to which the Almighty himself responds when he says, "I am the first, and I am the last, and besides me there is no God." *

It would also appear to be the meaning of this record that the act of creation was original and absolute. In other words, the writer indicates that the heaven and the earth were brought into being from nothing. Some who have made this subject their study think that they find this statement in the very terms employed. The word translated create in this narrative is the Hebrew *bara*; and this word, it is said, indicates absolute creation. It is not safe, however, to rest too much on this species of argument; for the primary meaning of the word *bara* is rather to shave, to cut, and to shape; and thus it applies quite naturally to building up a structure from existing materials. Moreover, the term is used in several places in Scripture where absolute creation is not a supposable

* Isaiah xliv. 6.

case ; as in Ezekiel xxviii. 13, where the creation of the city of Tyre is spoken of, and in Isaiah xliii. 7, where persons are spoken of as created, though begotten and born in the natural way. Nevertheless there may be such a handling of this term as would make it almost impossible to give it the lower meaning ; and in the first chapter of Genesis this handling is certainly significant.

Thus, while the origin of the universe is represented by the word *create*, the subsequent modifications and additions described are represented by other terms. From the second verse of the chapter, to the close of the twentieth verse, the word is *make*, or *bring forth*, or *set*, but not *create*. But, before the account of the fifth day's work closes, the story of that day upon which animal life appears, the word *create* comes in again. True, the things here created are said to be "brought forth" as well ; but the new thing, animal life, was a creation. This, in the twenty-first verse ; while in the twenty-seventh, where the closing work of the sixth day is described, and where another new thing appears, to wit, the immortal life of man, the solemn word *bara* is once more brought into requisition. At each of these points there was a creation : first, when the cosmic matter was called into existence, from which the "worlds were framed ;" second, where that new thing appeared which we call conscious life ; and third, where that being came upon the stage in whom everything was to culminate, immortal man. For these the word is *bara* ; for the rest it is some such term as *asa*, to make, or *tadhshe*, to bring forth.

The use of these selected terms, to describe the various acts of God, in world-making, may properly suggest

the inquiry whether creation, so called, did not occur in various ways. That it all came about by the divine power, and according to the divine will, there is no doubt. But may not the process, subsequent to the original fiat, have been in part by natural law? We shall see good reason, as we proceed, to answer this question in the affirmative. We shall discover that while at particular points there was a direct divine interposition, producing immediate results, in other cases the work was done by the steady operation of those natural causes with which we are now familiar, and under those general laws which God ordained when the constitution of the universe was first proclaimed.

CHAPTER IV.

MIND AND MATTER : WHICH WAS FIRST?

THE materialism of our day describes thought as brain-action. Destroy the brain, it says, and thought ceases. Damage the brain, or disturb its functions, and thought is damaged or disturbed in like manner. What we are accustomed to regard as spiritual in man is the product of what is material. Mind is generated by matter ; and if there be such a thing as a Universal Mind, universal matter gave it birth. This reverses our usual method of reasoning, and prepares for us a record which shall read, "In the beginning, the heavens and the earth created God."

It is a necessary starting-point in this discussion, that either mind or matter is self-existent. If matter preceded mind, so that the latter is its product, then is matter self-existent ; and if mind preceded matter, so that the latter is its product, then is there a self-existent mind. One or the other, mind or matter, is uncreated, and from eternity ; which is the thing we mean when we speak of self-existence. One or the other, mind or matter, owes its existence to no previous cause.

An advanced position in this argument, equally conclusive, would seem to be that mind is superior to matter.

It subordinates matter to its uses ; controls, combines, tears asunder, and treads upon it. Even the human mind does this ; and if we are to admit the idea of a creation at all, obviously mind receives matter as created for its uses. Mind is intelligent and conceives. Matter is 'unconscious and dead. Did the dead generate the living thing? or did the living thing create and give life unto that which is of itself dead ?

Our record indicates that mind came first and matter afterward ; and there is abundant evidence that there was a beginning to this material frame. If you take any existing type of animal life, you easily trace its history backward till you find the point where it first appeared on the earth. That was its beginning. If you pursue your researches in the vegetable kingdom you find it the same. The record is in the rocks. Any one who will study may learn to read it for himself. Each one of the ten thousand lines of animal and vegetable life runs back to a beginning. And if you go beyond the life-record to the rocks themselves, on which all this has been written, it is still the same. Every type of rock had a beginning ; and the geologist learns to point to that beginning, and to say, "Before that period, no such rock formation can be found." The universe is full of these indices. From every spot it lifts a finger-post pointing backward to an origin. It proclaims itself, too clearly to be misunderstood, a thing that has not always stood, but which began.

Well, if it began, then there was a cause. And as this cause was not matter itself, which up to that point had no existence, it must have been mind. And as this mind

must have been uncaused, and eternal, it must have been self-existent, which is the same as to say it was divine. There was a beginning to this material universe. That beginning was caused. That cause was not material but spiritual, and was itself uncaused. And that is the same as to say it was God. So nature herself proclaims what the record in the Book declares, that in the beginning, God created the heaven and the earth.

This doctrine was quite as contrary to the philosophy of the ancient world, as it is to certain schools of modern thought. Outside the Hebrew family, all the ancient philosophy ran toward the theory that matter was eternal. There was a belief in the existence of gods, indeed, and of gods that were world-makers ; but they were gods who built up from existing materials. Matter, as such, had no beginning. In some formless condition, at least, it existed from all eternity. Such was the Phœnician philosophy, such the Babylonian, such the Egyptian ; while as the Greek schools arose, such teachers as Democritus, and Epicurus, and Plato, and Aristotle appeared to give shape to these conceptions. Moses, being a man "learned in all the wisdom of the Egyptians," must have been familiar with this philosophy ; but he struck out a theory of his own. God revealed it to him. It was the theory so clearly stated by the apostle afterward, when he said, "Through faith we understand that the worlds were framed by the word of God ; so that things which are seen were not made of things which do appear." *

Ex nihilo nihil fit, said the schools ; and Moses answered back, There is a creator, God. He set aside the

* Hebrews xi. 3.

old maxim, as something irrelevant, or as something belonging only to that school of thought which had been generated by polytheism. The pagan deities indeed were not creators; but the one Supreme and Self-existent Being was such. He spake, and it was done. He commanded, and it stood fast.

Nor is the conception of such a creation entirely foreign to the better philosophy of our times. The relation of mind to matter, the point where the two bind together and seem to impinge the one upon the other, is found in the term force. The human mind generates a force which contracts a muscle and so moves an arm. Again it gives its fiat and it moves the head or the feet; and by this force, which it spontaneously generates, it subjugates the physical world.

And when you ask, What is matter? perhaps the most philosophical answer possible is, Matter is force. It repels what crowds against it, or is itself repelled. And if you add to simple force certain things adjunctive, such as form and color, and then if you generate certain modifying forces, such as gravitation and chemical affinity, you at once begin to build up Nature. You get hard matter. You get natural law. God, the Spirit, establishes these forces, and orders these adjuncts; and the result is a system endowed for self-movement, which, once set going, runs on like a clock until its Author chooses to stop its motions.

This is one of the latest, and one of the most subtle conceptions of Nature. Matter is force. Stripped of all that is adjunctive and extraneous, and brought down to its simplest philosophical terms, matter is a force estab-

lished by the great Spirit, God. As our minds generate force at will, in a way we cannot fathom, contracting our muscles, moving our limbs, and giving us dominion over Nature, so did the Eternal Mind, in a way we cannot fathom, generate and establish that resisting force, out of which came the present order of things. This force continues while he pleases. To us, it is indestructible; and so we say that matter only changes form, and is never annihilated. But when he who established that force sees fit to call it back again, then form, substance, quality, all that we know or can conceive of matter will disappear,

“Nor leave a wreck behind !”

CHAPTER V.

THE BEGINNING: WHEN WAS IT?

IT was once common to suppose, that the original creation of this whole material universe occurred about the year 4004 B. C. There were indeed some, holding no mean position in the church, who declined accepting that theory; but the opinion somehow became prevalent, and was regarded as the solemn teaching of Holy Scripture. One author went so far as even to surmise the day of the month, September 21, 4004 B. C.! And this notion, in a form more or less definite, is still rooted in a great many minds; so that with many persons, to say that this globe was built more than 6,000 years ago, and especially to say that man has been upon it for a greater length of time, is the same as to deny the truth of the Bible. And the result has been, that men who have always hated the Bible, have seized their opportunity, and have so pushed the evidence of the antiquity of this planet, that some have even seemed to fear lest the old Book must go down. There has been, however, a kind of lull in the battle lately, during which good men have been wise enough in some cases to read the record once more, and carefully inquire what it says. And the more carefully they have inquired, and the more diligently they

have studied, the more thoroughly have they become satisfied that the Bible assigns no exact date to the creation. As a marginal reference, or as a running title, the Book may be printed with the heading for Genesis, first chapter, "4004 B. C.," but that is the work of the printer or of the publisher, and Moses is not responsible for it. He says "In the beginning," nothing more.

Some of the early writers of the Christian church discovered this fact, and called attention to it. Justin Martyr noticed it; and so did Basil and Cæsarius and Origen; and among later authors, Patrick, Calvin, and Jennings, all allow that the beginning may be put indefinitely away.* These men wrote without the slightest knowledge of geology, and under no pressure such as might be supposed to be created by modern scientific discovery, and yet they conceded that so far as the record could be made to show, the work of creation might have been performed at a period far more remote than the traditional 4004 B. C.

The lessons we have been learning on this subject are precisely the same the friends of the Bible were obliged to go through about three hundred years earlier, when the modern system of astronomy was being settled. It was at that time generally supposed that the earth stood immovable, at the centre of the great celestial sphere; and when the new science announced that it was spinning about its axis like a boy's top, and worse than this, being shot through the spaces like a great cannon ball, all its seas and cities and people holding fast upon it as best they might, the suggestion was regarded as very un-

* "Science and the Bible." By Herbert W. Morris, D. D.

scriptural, not to say alarming. So great indeed was the opposition to this new science that some men were near losing their lives for it. And yet how completely has the conflict passed away! The Bible survives, and so does the Copernican astronomy; and no one in our day seems to have any desire to set the one against the other. No friend of the Bible considers himself obliged in the interest of religion to say that the world makes no journey round the sun, nor does any astronomer regard himself as called upon in the interest of his science to deny the truth of the Bible. The two books, Nature and Revelation, stand side by side; and, so far as astronomy is concerned, in perfect harmony. So will it be with the conflict now upon us.

That our world is of very great antiquity, cannot well be doubted. Nature has a system of tally-sticks on which she notches off the centuries, and by which, in a general way, she writes out her own age. When a great tree is cut down you count the "rings" from the surface to the heart, and judge very closely how old it is. So, there are rings on the earth, indicating, with at least approximate accuracy, what ages must have passed by since time began. Some of these time-marks are made by our rivers. An illustration may be taken from the Genesee, in Western New York. Just below the city of Rochester, this river leaps down a precipice of about one hundred feet into a gorge, cut in the solid rock, through which it makes its way to Lake Ontario. That gorge was manifestly cut by the river itself; and the length of the cutting is about seven miles. The work is still going on. The river is removing the rock, and ex-

tending the gorge up toward its source at the rate of about one foot in every four years. That is, this stream makes a clean cut from the rock to the depth of about one hundred feet, at the rate of about three inches every year. Now as there are 5,280 feet in a mile, the cutting of a gorge like this for the distance of one mile, at this rate, would require 21,120 years ; and the entire seven miles to the lake would require 147,840 years. The river, however, was once much larger than now, and the rock was then perhaps less firm. So we will only claim for this work a period, in round numbers, of 50,000 years. This must be regarded as a very moderate reckoning. The Genesee River has been flowing in its present channel at least 50,000 years.

This is one notch in our tally-stick ; let us take another. We have reckoned by what is known as the Upper Fall only. The rock through which this fall cuts is mostly a limestone, and was formed by a slow deposit on the floor of an ancient sea. Largely it is built up of the cast-off shells of marine creatures. Many of these were very small creatures, some microscopic, and as they died and their shells fell upon this sea-floor they gradually formed this limestone rock, one hundred feet thick. This was a slow process. It never could have occurred in less than 100,000 years. And underneath this limestone rock lies one of sandstone, through which the Lower Fall cuts its way, the formation of which must have required at least 100,000 years more. So, putting our figures together, we get at this one point on the earth's surface, a tally-mark of at least 250,000 years. By similar reckonings in other parts of the world, where the rock deposit,

all combined, is sometimes found twenty miles thick,* we get a date almost infinitely remoter. The beginning recorded in Scripture, therefore, must have been millions of years ago.

A few good men may indeed be found yet, who deny all this, and who consider it their duty to say, "The Bible is against it;" but when such men as Principal Dawson of Montreal College, and Professor Dana of Yale, and Dr. Arnold Guyot of Princeton, accept these conclusions, we need not fear to accept them also. These men, and others like them, are as firm in their christian convictions as they are profound in their scientific attainments. They understand the Scriptures, too, and they can find no place in holy writ where the statement is made that this world of ours was created only 6,000 years ago. It is an old world: part of a general system of worlds. And it is altogether a mistake to suppose that the date of its creation is in any way more definitely fixed by the sacred record than to say, it was "in the beginning."

* "Sketches of Creation." By Professor Winchell.

CHAPTER VI.

TOHU AND BOHU.

THE ground over which we have thus far passed is covered by the first verse of the first chapter of Genesis. We now advance a step and consider the statement made in this narrative, in regard to the early condition of our planet. This takes us to the second verse of the chapter, which reads as follows: "And the earth was without form and void, and darkness was upon the face of the deep." The Hebrew terms rendered "without form and void" are set at the head of this chapter. They are *tohu* and *bohu*; and we will endeavor to ascertain their exact meaning.

In almost all nations, there has been a tradition that our world, at a very remote period in the past, was in a state of chaos. Thus, the poet Hesiod says, almost as if quoting from Moses, "In the beginning was chaos;" and this condition of things he describes as a commingling of earth and air, fire and water, cold and heat, light and darkness. And Ovid's oft-quoted words, *rudis indigestaque moles*, a "rude and unformed bulk," echo the same conception of those ancient times.

The terms used by Moses to describe this state of things signify confusion and emptiness; and, in that very old Greek translation which we call the Septuagint, the

rendering is "unwrought and invisible." *Tohu* signifies confused or unwrought; and *bohu* signifies empty, and invisible. Prof. Tayler Lewis, one of the ablest philologists of our time, says that the two terms refer, "the one to utter irregularity of dimensions and outward extent, the other to deficiency of gravity, denoting not so much an absolute as a relative want of weight;" and adds that the language would describe "a fluid or rarefied condition, with an absence of all solidity and cohesion, or it may be a huge nebosity, that had been floating through space for millions of years, if any such term can be employed of that which has no inward or outward measure of time."*

This interpretation is very remarkable: the more so, because Professor Lewis seems afterward to suppose that Moses is describing our globe as it was after it had assumed a solid form, though yet in a broken and disordered condition. "At this period," he says, "it was a wide fluid mass, a waste of water, without a shore, without a bottom, without a sky above, or any terminating solid bound."† When therefore he says that the terms used would describe a huge nebosity, floating through space, he does so as a conscientious interpreter, and not as obliged to put this meaning on the passage by the exigencies of his own theory. His theory would rather be against such an interpretation; and yet he says such is the literal rendering of the terms—"instability and irregularity of outline," and "deficiency of gravity," in short, "a nebosity," or cloud-like thing "floating through space."

* "Six Days of Creation," page 60.

† Id., page 63.

We shall not greatly miss the truth, therefore, if we say that Moses here describes our world as a nebula. He might even be supposed to describe it as a part of an immensely greater nebula, from which it had not yet been separated. The matter of which the present globe is composed was, at the time of which he speaks, in that condition. It was nebulous matter; it had no settled shape; it had little cohesion; it was vaporous in character; it was diffused through an immense region of space, and, for aught Moses says to the contrary, it may have been at the time mingled with the matter now forming other globes and suns and systems, a part of one common nebula, out of which this entire material universe has been constructed. This would be a natural interpretation of the terms here used. If, in any way, it should ever be ascertained that our globe was once in a nebulous condition, or that it was once even a part of a still greater nebula, it would be fair to say that Moses seems very much to describe that state of things. He says that it was at first *tohu* and *bohu*, and that means that it was a nebula.

One other statement still remains: "Darkness was upon the face of the deep." What was this deep; and to what period does this statement refer? "The deep," in Scripture, commonly means the sea, but not always, as may be seen in such passages as Luke viii. 31, where the demons entreat our Lord not to send them out into the deep. And in the passage now before us, the Septuagint renders the term, the abyss. The Hebrew word thus translated here is *tehom*, which, according to Professor Lewis, is the same as the *tohu*, though the two words

have not the same root. The deep was the thing without form and void ; and the only addition we have obtained to the information given in the first clause of the verse is, that this void and formless thing was dark.

The expression is without qualification. This nebula, if such we are to regard it, was not luminous in itself, nor did any light shine upon it. The great mass was itself dark, and all the spaces beyond it were dark. No created eye could have seen it, nor could such an eye, looking out from it, have discovered, even in the utmost distance, so much as the faintest twinkle of the feeblest star. There it lay, empty and desolate, unwrought and invisible, *tohu* and *bohu*, an object to human conception meaningless and unpromising. And yet what is most unpromising in its beginnings sometimes contains capabilities the most wonderful. And this black, empty vapor held within it the germ of all these starry worlds. The blue sky was there, and the silver moon, and the sun that dazzles the eye with its blaze. This globe was there with all its continents and rivers and seas. God saw all this, and as those possibilities one after another unfolded, at his word, he pronounced them good.

How long it lay in this condition, Moses does not say. So far as his record shows it may have been but an instant ; or equally, it may have been millions of years. There were no time-measures then, and a thousand years were much the same as one day.

CHAPTER VII.

THE OTHER RECORD: DOES IT AGREE?

IN nothing are our men of science more generally agreed than this: that our planet, at an early date, was subject to an intense heat. All the strictly "primary rocks" were once in a melted condition; and the globe itself has assumed just the shape that would be taken by a drop of liquid matter, rapidly whirling on its axis. These indications, and many others of like character, point to a time when our whole world was in a state of fusion, and when it swung round in its orbit a huge blazing star.

It is but one step beyond this, to just such a condition of things as is described in the second verse of the first chapter of Genesis. For, as it seems quite certain that our planet was once melted, so it would need but a sufficiently greater degree of heat, to change the molten mass to vapor, or to make it a nebula.

In this way we can vaporize the hardest substances. Take for example a piece of steel. Let it be the very finest and hardest of steel—a watch-spring. If you heat this steel in a furnace, it becomes liquid, or melts, and lies in the crucible a red, glowing mass. If you apply to it a heat still more intense, as the blaze from a compound

blow-pipe, it not only soon begins to melt, but to burn ; and that with the most brilliant light conceivable. To use a common phrase, we "burn it up," which means that we change it to invisible vapor.

Now what may be done in this way with a watch-spring, may be done with a whole world, or with a solar system, or with a whole group of such systems. If the Creator please to apply to these systems the agency of heat, in sufficient degree, they change to vapor, and become one mingled, undistinguishable, impalpable haze. From these solid systems to the nebular condition of things the transition is perfectly simple and plain. Or reversing the process, this universe may have been originally created in a nebular condition, and then the simple process of slow cooling would bring it down into fluid matter first and into solid matter afterwards.

And to show that this is no mere theory, we have among the heavenly bodies this process going on before our eyes. Our moon, small among the worlds, has cooled off very rapidly, and is a waterless, lifeless thing, as cold as a piece of frosty steel. The world we inhabit, being larger, cools more slowly ; and enjoys at present that temperature which is best fitted to sustain life. It is like the steel still pleasantly warm from its late contact with the fire. The planets Jupiter and Saturn, being much larger, cool more slowly still, and are much in the condition of the steel while red-hot ; their satellites, perhaps, still warmed by these planets, from which they are sprung, being about in the condition of our own globe. None of the planets are now vaporized ; though Saturn is encircled by a ring, thrown off when it was in a vaporous con-



THE SOLAR SYSTEM AS A NEBULA.
(From Winchell's "Sketches of Creation," New York: Harper & Bros.)

The first part of the history of the world is the history of the human race. It is a history of the progress of the human mind, of the growth of the human soul, of the development of the human spirit. It is a history of the human race, of the human mind, of the human soul, of the human spirit.

The second part of the history of the world is the history of the human race. It is a history of the progress of the human mind, of the growth of the human soul, of the development of the human spirit. It is a history of the human race, of the human mind, of the human soul, of the human spirit.

The third part of the history of the world is the history of the human race. It is a history of the progress of the human mind, of the growth of the human soul, of the development of the human spirit. It is a history of the human race, of the human mind, of the human soul, of the human spirit.

The fourth part of the history of the world is the history of the human race. It is a history of the progress of the human mind, of the growth of the human soul, of the development of the human spirit. It is a history of the human race, of the human mind, of the human soul, of the human spirit.

The fifth part of the history of the world is the history of the human race. It is a history of the progress of the human mind, of the growth of the human soul, of the development of the human spirit. It is a history of the human race, of the human mind, of the human soul, of the human spirit.

The sixth part of the history of the world is the history of the human race. It is a history of the progress of the human mind, of the growth of the human soul, of the development of the human spirit. It is a history of the human race, of the human mind, of the human soul, of the human spirit.

The seventh part of the history of the world is the history of the human race. It is a history of the progress of the human mind, of the growth of the human soul, of the development of the human spirit. It is a history of the human race, of the human mind, of the human soul, of the human spirit.

dition ; while Jupiter has numerous vapor belts such as a heated planet would produce. They are not melted planets, or blazing planets, but they are evidently in too heated a condition to constitute a suitable abode for such a being as man.

If we now rise one step above the planetary range, and come to the sun, we find it, as we might expect, the hottest thing in our system. Essentially, it is the system ; the planets being but fragments which it has thrown off. Its huge bulk, many times greater than that of all the planets united, cools slowly. And so we see it blazing yet, just as the planets themselves did, long ages ago. Nevertheless, the process of cooling is going forward ; and there is no reason to doubt that, in due time, so far as temperature is concerned, the sun may furnish a suitable home for beings like ourselves.

Besides this, there are certain way-marks quite out beyond our system, where we seem to see matter in a more primitive condition still. Even to the naked eye, certain curious patches of light appear in the starry heavens ; and by the aid of the telescope we find still others, where the vaporous matter, already become luminous, is slowly condensing into systems and stars. Nor are there wanting certain obscure but unquestionable dark patches in the sky ; some of which, like the so-called "coal-sacks" of the Milky Way, are at times quite conspicuous, and which strongly suggest to us that stage of primeval matter when "darkness was upon the face of the deep." So we trace the line of succession : the dark nebulae, showing us matter that has not yet become luminous ; the light nebulae, showing us matter upon which God has pronounced the

words, "Let there be light;" the melted, burning, blazing systems, like the sun and the stars; and the various planetary worlds in successive stages of cooling, from almost red-hot Jupiter down to our poor frozen moon.

From such data as these, men like La Place and the younger Herschell wrought out a theory known as the Nebular Hypothesis; and according to this theory, all the planets, asteroids, satellites, suns, and stars of the great group to which we belong, and which is best observed in the Milky Way, once constituted such a nebula as we sometimes see now in the far-off sky. The doctrine was that all these stars and systems once existed as a "thin, impalpable haze," filling all the immense spaces now intervening; that somehow this nebula was set whirling; that in process of whirling it broke up into fragments; and that these fragments, still whirling, still further condensed and consolidated into the worlds and systems which we now behold.

This splendid hypothesis at one time received a severe shock, and seemed likely to be overthrown. Some unusually powerful telescopes were constructed, particularly one by Lord Rosse; and it was found that some of the supposed nebulae were simply groups of stars. On this discovery, the conclusion was somewhat hastily formed, that all the supposed nebulae were of that nature. But an instrument was soon after invented, known as the spectroscope; and by means of that it was determined that some nebulae at least were in a true vaporous condition. So the Nebular Hypothesis has revived once more, and is now generally accepted by scientific men. Indeed, Dr. Alexander, of the College of New Jersey, is said to

have demonstrated the truth of this hypothesis, by an exhaustive mathematical calculation. *

So, our latest conclusions in the field of science lead us precisely where we found ourselves when we had finished our interpretation of the second verse of the first chapter of *Génesis*. Moses in that verse describes primeval matter as unshapen, diffused, and dark ; and Science, by her most recent utterances on the subject as given in the *Nebular Hypothesis*, answers, "So it was." How it was that Moses put on record, 3,500 years ago, substantially what our scientific men have only recently discovered, let those answer who deny that he wrote by inspiration of God. How did Moses know in that age of mental night, and before one of our modern sciences was born, what the rest of the world has for nearly 4,000 years been struggling after, and has now but just discovered ? The simplest, easiest, most natural answer to this question is, that he was taught of God.

* See Prof. Guyot's paper read before the Evangelical Alliance in 1874.

CHAPTER VIII.

A WORLD ON FIRE.

WE have already observed that a melted substance is vaporized by increasing the heat upon it. In like manner a vaporized substance may be made to assume a liquid form by the process of radiation or cooling. And then the liquid substance may be made a solid, by cooling it still further. Our most readily understood illustration of this statement may be taken from the different forms of water. Water is a fluid; and by increasing its heat it becomes vapor, and by diminishing its heat it becomes ice. Water heated intensely, so as to form true steam, becomes an invisible vapor; and this vapor, first condensing so as to become visible, soon after, as it cools, becomes water again, and then, still cooler, becomes solid ice.

Through just such changes has our world been passing. In the former chapter we saw it as a vapor: in this, we shall regard it as a world of melted matter; or, as it would seem to a beholder, a World on Fire.

It has been found by experiments made in boring artesian wells, and by tests taken in deep mines, that the earth is warmer below the surface than it is where we commonly stand. Speaking in general terms, the tem-

perature at the depth of one hundred feet is one degree higher than at the surface ; and for every additional hundred feet of depth, the mercury rises about one degree more. Of course it will be seen that if this rate of increase should steadily continue as we descend, everything within the globe, at a depth of eight or ten miles, must be in a state of fusion. Owing, however, partly to the pressure upon the surface of this melted mass, and partly to various other causes which need not here be indicated, it will perhaps require greater heat to melt the rock inside the earth than the above reckoning would lead us to suppose, and so the earth-crust is undoubtedly much thicker than this calculation might imply. Moreover, there is some reason to believe that at great depths the increase of temperature would be found somewhat less rapid ; and there are places on the globe, no doubt, where the earth's crust may be an hundred miles thick. Even this, however, makes it but a shell ; and, in particular places, it is manifestly a comparatively thin shell. Very few persons, therefore, who have given the subject their attention, will at the present day doubt that our globe, except as to its outward shell, is a mass of incandescent matter.

It confirms this view that on nearly every part of our world there are marks of volcanic action. That is, the melted matter has everywhere been breaking through the shell, and spouting forth its rivers of lava. Volcanoes, not a few, are still active ; but the proportion of these to the immense number of volcanoes now extinct, that have left their marks on the globe, is very small. Once these open places through the earth's crust were seen almost

everywhere ; but as our planet cooled, one by one they closed up, and now the number is comparatively small. The source of heat, however, of which these volcanoes were the vents, must lie nearly everywhere beneath the surface of the earth.

All this points to a time when our globe was made up entirely of such melted matter as these volcanoes have spouted forth. And, even now, it is not so cooled but that in certain places, there occurs at times a dangerous outburst ; while in still wider sections of country, the ground is often so disturbed by earthquakes induced by the same cause, as to endanger the inhabitants. These upheavings and outbreakings are the remains of a once universal agitation—the reminders of a period when our planet was as yet no possible home for such a being as man.

Add to this the fact already noticed, that our globe is flattened at the poles and bulged out at the equator, just as we should expect it to be if it revolved on its axis while in a liquid state. Add another fact : all the oldest rocks, all those known as “primary,” are of igneous origin, and show the action of fire ; that is, they have all at some time been melted ; and their heat has been such, at times even since the stratified rock was deposited, that the latter have been quite changed in character by the contact, forming what is known as metamorphic rock. Put into the account still another item, that there has been a crumpling, wrinkling, crooking, and upturning of the rocks in numerous places, as if the shell of the earth had become too large for the constantly shrinking enclosure within it. Put all these items together, and you have

almost if not quite a demonstration of the fact that this world was once a globe of liquid fire. It remains so yet, indeed. As to its principal bulk it is the same molten mass as in the times referred to. It is like a deep lake frozen over ; and we build our cities on the ice-crust, as it were, with the solemn warning distinctly before us in God's Word, that the day is coming when it will be once more a world on fire.

This is the second stage in the creative process by which our world was formed. Moses makes no allusion to it, unless perhaps he intended to cover this chaos of fire, as well as that of nebulous matter, when he spoke of the *tohu* and *bohu*, but it has its bearing on what goes before. If the nebulous condition of matter as described by Moses were its primeval condition, this is what we would expect to discover—evidence that at a later stage this planet was a mass of liquid fire. Such evidence we find ; and it forms a connecting link between the primeval condition of matter and the present condition of our globe. Nay, it lifts a beacon that casts its glare forward ; and helps us to understand what is meant by the apostle when he says that hereafter “the heavens shall pass away with a great noise, and the elements melt with fervent heat.” *

* 2 Peter iii. 10.

CHAPTER IX.

A CHAOS OF BOILING SEAS.

WHILE this planet was in the molten condition already described, we may suppose it to have been regularly making its journey round the sun, the same as now. And as its mean distance from the sun is about 95,000,000 of miles, its whole orbit would measure about 570,000,000. These figures are not intended to be exact, but they serve to represent the great journey our planet performed of old and still performs every year.

This journey lies through cold space. How very cold the region is which it thus traverses, we may judge by merely going out into it such small distance from the earth's general surface as we may reach by climbing a mountain. A very moderate height on such mountain takes us to a region of perpetual snow. On the highest summits, even in the torrid zone, the thermometer stands at a point far below zero. And were we able to reach a distance in space of not more than fifty miles from the earth, we should come to a degree of cold of which we have never formed any conception. It has been estimated that the mean temperature of the spaces through which our globe travels is not less than 230° below zero. Rev. Dr. Burr, in his "Ecce Cœlum," puts it at $50,000^{\circ}$ below.

These estimates simply signify that such space is inconceivably colder than anything of which we have any knowledge. And if that be so, it is not wonderful that the original vaporous masses were condensed into molten matter, or that a melted globe should after a time be crusted over with a solid layer of stone. As a lake in winter covers itself with ice, so this lake of fire, passing through those cold spaces, was frozen over, as it were, and shut in with a cover of stone.

The process would not be so rapid, however, as we might, perhaps, suppose. This infant globe was not sent unclad on its long, cold journey, but was well provided with warm, fleecy wrappings. We seldom think of the dense vapors and clouds that occasionally obscure our sky, as intended to keep our world warm; but they have an important commission for that purpose; and we can frequently see their working. As the cold season approaches in autumn we sometimes say, "If it clears off, there will be a frost to-night;" and so we find it. A clear night brings frost; but a cloudy night checks the rapid radiation, and we escape. The cloud-masses that at present encompass our globe, however, as compared with those in which it was wrapped at an earlier day are very thin and slight. At that time, when this was a molten world, all the water now in the seas was thrown up in the form of dense vapor. Besides this, all the carbon now forming our coal mines and forests then hung over the earth in what we should call thick smoke-clouds, charged with carbonic acid gas. While added to all this were numerous other substances, such as sulphur, gypsum, salt, and even limestone, which were entirely vaporized by the

intense heat, and which went up as the smoke of a great furnace, to complete the "swaddling band" with which God wrapped his infant world.*

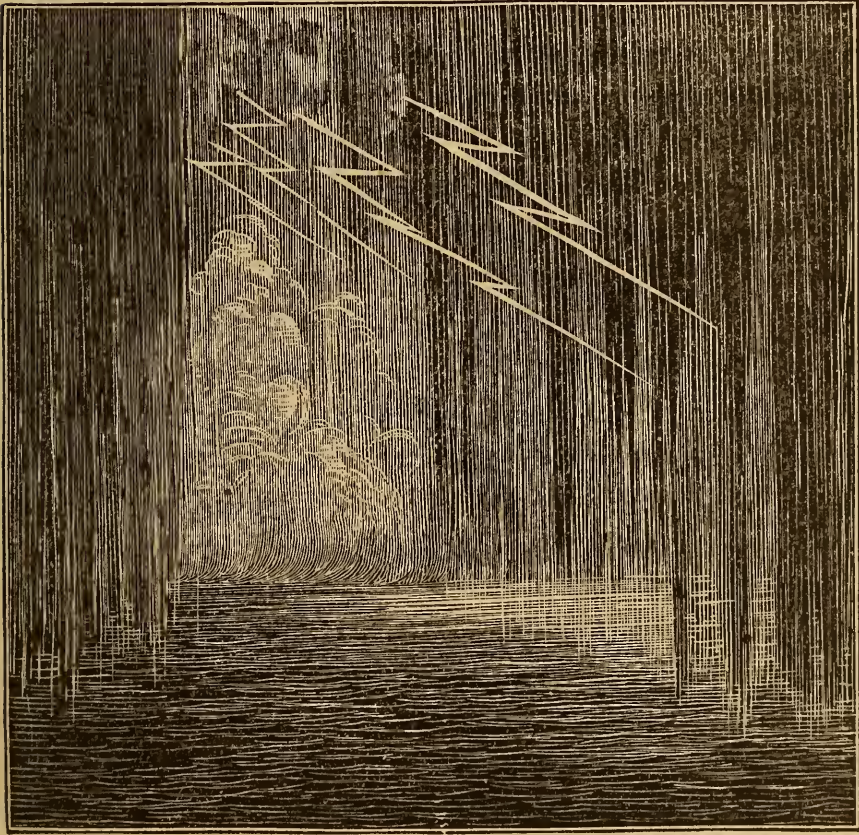
The mighty frigidity of the spaces through which it traveled, however, prevailed against all these preventions, and the earth steadily grew colder. On the outer surface of its vaporous envelope drops of acrid rain would form, changing rapidly to bright hailstones or to flakes of snow. And these once formed would immediately drop into the glowing torrid mass below. But long before they reached the surface of the earth, they would be vaporized once more and shot upward again in swift steam-columns into the upper air.

Meantime, on the fiery surface of the planet masses of slag and cinder would begin to form, floating there as slag floats on melted iron, or as ice floats on water. At length it covered the surface; but the fiery ocean had its tides, and the floating film that rested on it kept breaking. It grew stronger and thicker, however; and at last the fire was got under. Then there were upheavings, and great fissures opened in the rock, through which the molten matter was spouted out again. Then it was once more got under, and the hatches were put down; and as the cooling process still went slowly on, the inner mass shrank away from its rocky covering. This left that covering in great wrinkles, as an apple skin is left in wrinkles by baking the fruit in an oven; and this process of wrinkling gave the world, here an incipient mountain chain, and there a sea-basin, too shallow at first, however, to hold a deep sea.

Then the overloaded atmosphere renewed its energies;

* Job xxxviii. 9.

and "down came the deluge of sonorous rain." It was not the pure soft rain which now distills upon the meadows; but a rain saturated with sulphur, chlorine, carbonic acid, and whatever else could combine with it in the upper air. It rained aquafortis. In great corrosive



AGE OF STORM.

storms it fell; and falling, it struck upon the red-hot rock. In great steam-jets it was shot back again; and there were hissings, and explosions, and the development of electrical action, till the thunders bellowed, and the lightnings flashed through the gloom, and great earthquakes

shook the hemispheres. It was the storm epoch ; and equally, it was the epoch of the pulverizing of the surface rock. For perhaps ten thousand years it poured on. Then things began to grow quiet. Gradually the rock was made cool enough to retain the moisture. And so great floods began to pour down the mountain sides, and to fill those shallow, steaming cauldrons which have since become our seas. The fires were got under. The waters were triumphant. And, with scarcely so much as one rock summit projecting above the surface, one great ocean covered our planet from pole to pole.

We have named this epoch the Chaos of the Boiling Seas. They were muddy seas as well ; containing or covering all the sediment washed from the hot rock by that thousand years of acrid rain. And it was a dark epoch, too, for the world had shut in its own fires, and was wrapped in such masses of vapor as quite excluded the light of the sun. The lightnings would, indeed, now and then cast their glare across the awful scene ; and a volcano, here and there, bursting from beneath the waters, would hold up its lurid torch against the black sky, but with this exception, "darkness was upon the face of the deep."

Some of the features of this epoch will answer to the terms in which Moses describes the chaotic age. It may not be certain that he had this period at all in mind ; but whether it were this, or the epoch of the burning planet, or whether, as suggested, he looked still further back to the period when the cosmic matter was only a vapor, one thing is certain : in our looking for a chaos, in the early period of our world's history, such as he indicates in his

story, one is easily found. When he calls down to us to say, "Before life appeared, there was *tohu* and *bohu*," Science answers back, "Yes; if *tohu* and *bohu* signify chaos, the statement is true three times over. There was a chaos of cosmic matter, which we call the nebula; there was a chaos of melted rock; and there was a third chaos of corrosive rains, thick vapors, black skies, and boiling seas."

How did Moses know all this? The simplest, easiest, most natural answer is, that he was taught it of God.

CHAPTER X.

MAHEREPHETH : THE BROODING.

THE order of writing in Hebrew narrative is not altogether an order of time, but often much more an order of subjects. That is, the narrator first completes his theme ; and then, if it be necessary, turns back to take up what has been left behind. This is illustrated quite fully in the genealogical record of the eleventh chapter of Genesis, where each man's life is followed through to the end, before his son's life is taken up in like manner. Thus there is an overlapping of one part of the narrative upon the other, sometimes to the extent of several hundred years. And Salah lived thirty years and begat Eber. And Salah lived after he begat Eber four hundred and three years and begat sons and daughters. And Eber lived four and thirty years and begat Peleg.* The two lives overlap each other.

So is it in the story of creation. The writer takes up the *tohu* and *bohu* and travels down with it to the end. Having begun upon this subject of chaos he continues it until chaos is succeeded by order and life. Then he goes back and takes up a second topic, which in the order of time would open while something of chaos was still upon

* Gen. xi. 14-16.

the earth. Thus is it with the theme to be gone over in the present chapter. We have named it from the Hebrew term "maherepheth," which signifies a brooding. The words in which it is found are these: And the Spirit of God moved upon the face of the waters.* The word rendered moved is this *maherepheth*, which signifies a brooding.

Some have supposed that the waters here spoken of are those of the great dark turbid ocean, mentioned in the previous chapter. But the date seems earlier. What is here recorded is rather the first movement that occurred in that dark and dead cosmic matter, out of which the worlds were framed by the word of God. This moving of the Spirit on the face of the waters was a moving upon that expanded nebula which afterwards brake up into these stars and systems.

But how should this be called a moving upon the waters? Does not the term waters strictly confine us to the conception of a moving upon the seas, or streams, or fountains of our planet? To this, the answer must be, that such is not by any means a necessary conclusion. In Genesis i. 7 we read of "the waters that be above the firmament;" and so again in Psalms cxlviii. 4. By this, of course, is meant the clouds and vapors floating in our atmosphere. And thus we see that the term is not confined to the lakes and the seas, but is applied to the clouds and the vapors as well. So that if you assume that the original condition of matter was vaporous, cloudlike, nebulous, a Hebrew in speaking of it would quite as naturally call it "the waters" as anything else. When therefore it

* Gen. i. 2.

is said that the Spirit of God moved upon the face of the waters, we are quite at liberty to suppose that the writer is describing some great change in the original mass of dark nebulous cosmic matter. What change that was we shall see further on. At present it is sufficient to understand that this nebulous matter constituted the waters on which the Spirit moved.

What was this Spirit of God? The word thus translated is, in the Hebrew, *Ruah*, which in its primary signification means the wind. So that some have read this passage, "the wind of God," or a great wind. Such a wind, they say, blew upon the face of the waters, tossing those early seas which encompassed our globe, clearing away the overhanging vapors, and preparing for the breaking in of the light of the sun. But this interpretation is not admissible. The word *Ruah* does indeed literally signify a wind; but it is the constantly used term for the divine Spirit; and the instance can not be found in which the phrase *Ruah Elohim*, Spirit of God, means merely a great wind. This is the expression employed where the Spirit of God moved upon Samson, or where it moved upon the old prophets and inspired men. It is not a mighty wind that is thus designated, but a divine energy. And what we are to understand here is, that after God had created matter in chaotic form, he put forth his almighty energy upon it to give it order and to impregnate it with the principle of life.

This view is still further sustained by the use of the term *maherepheth*, translated moved. That word is never applied to the blowing of the wind. It is the word that represents the fluttering, hovering, brooding of a bird

upon its nest. It is the word used in Deut. xxxii. 11, where the eagle is spoken of as stirring up her nest and fluttering over her young. That nebulous mass, under this brooding, was like the egg warmed by the mother bird. It began to assume new character. A life principle was quickened in it. There began to be motion, order, and form. Professor Tayler Lewis says that we have in this representation "the first beating of Nature's pulse, the first throbbing of her mighty heart. Or, to change the figure, and yet keep as its grounds the same primary image, the tremulous motions indicated by the Hebrew verbs are the first notes in the grand diapason, the first low trembling barytones, in that ascending scale of harmonies that were to terminate at last in Eden and humanity." *

One of the mysteries of the material universe, which no science has yet been able to clear up, is motion. It is a very first principle of physics, that the natural state of matter is rest. It is inert. It has no power to move. It resists, in greater or less degree, all power applied to move it. And left to itself, it remains forever motionless. Yet, singularly enough, everything we see has somehow been set in motion. Our planet is in motion, and that in several different directions. The sun is in motion; not only turning on its axis, but moving with all its planetary train in a vast orbit. And it begins to be more than suspected that the same is true of every star in the firmament. Something has come in upon this physical universe which has broken up its state of rest. What agent is there that has made this stupendous change? Science

* Six Days of Creation, page 67.

fails to answer this question ; and so revelation lifts the veil that hides the mystery and answers as in the passage before us, "the Spirit of God." The original nebulous mass was somehow set whirling about a centre ; and Moses tells us here by what Hand that motion was imparted.

But there is something besides motion suggested here. This brooding means much more. Brooding induces motion, indeed ; but that is a result of certain vital forces with which the egg is quickened by the process. And we shall not greatly miss the meaning of this narrative, if we suppose that the work represented by so significant a term imparted to the cosmic matter certain qualities, and gave it certain laws, which it previously did not possess. Whence came gravitation ? perhaps from this brooding. Whence came these chemical affinities, this law of crystallization, this electrical action ? perhaps all this and more too was imparted to dead matter when the Spirit of God moved upon the face of those waters. Professor Tyndal says that he sees in matter the potency and the promise of every kind of terrestrial life. His remark is an unguarded one, and has been criticised by a good many very incompetent persons, as well as by some able men. But what if he sees in matter only what God put there by the very act we are now considering ? Let Professor Tyndal frankly say as much as this, and we need have no further quarrel with him. Admit, if you choose, that there is a potency in matter to develop into vegetation. Admit that vegetation has a potency to develop into animal life. Admit that animal life may develop into immortality, as in man. That does not rule out the conception of an original Creator at all, nor does it force us to the con-

clusion that there have been no divine interpositions since the original fiat was uttered. Notwithstanding all that, it might still remain true that "in the beginning God created the heaven and the earth," and that subsequently the Spirit of God so brooded over this creation that exactly such potencies were imparted to it as Professor Tyndal claims to see. Nay, this brooding may have been more than once repeated : the term covering not only one act but a succession of acts, extending far down the history of our world. The terms which Moses uses are broad enough to cover all this ; and we are at liberty to frame such theories as may best fit the facts in the case.

People are often unnecessarily anxious on such matters. The theory somehow has got hold of a great many minds that when God is said to have created anything, we are to suppose that he produced it in a perfectly completed state. But this is not so. It is quite as common for God to create things in the germ, giving to that germ certain potencies for development. Thus, there is not a bird that flies in the air but God is its creator ; though he made it not a bird at first but only an egg. And so there is not a human being on the earth but God is his creator ; though certainly he no longer creates human beings full grown. So with this vast material universe. He created it in the germ. It was at first *tohu* and *bohu*. Then the brooding Spirit came down upon it ; and its heart began to beat and its pulse to throb with life. The energy was repeated at successive stages ; not in every change that occurred, but at the salient points where a new order of energies came into play. So was the dead matter impregnated

with vital forces, making it productive of higher forces. And so was it uplifted by these repeated impacts of almighty power, till it stands before us to-day the study of our philosophers and the wonder of our minds.

CHAPTER XI.

LET THERE BE LIGHT.

THE division of the sacred narrative into chapters and verses occasionally interrupts the story at the wrong point, and associates things which are disunited. Thus the second verse of the first chapter of Genesis were better concluded with the statement that darkness was upon the face of the deep; for at that point the writer finishes his description of chaos. The remainder of the verse, "And the Spirit of God moved upon the face of the waters," naturally associates itself with the call for light in verse 3; for as a natural cause, that moving produced the light. That divine energy which imparted motion to the nebulous mass; and which gave it gravity and electricity and chemical law, would, in the natural working of things, render it after a time luminous. That is, the impact of the atoms against each other, under the new force of gravitation, the chemical action induced by their greater proximity and the electrical forces developed as the process went on, would create light; and thus, perhaps, we are to suppose that light was created.

An extreme literalist might object to this view of things. There was a divine call, he would say. God said, "Let there be light;" and it was in answer to this word that

that light immediately sprang up. Be it so. Imagine, if you choose, that there was an audible voice, and that nature responded with a sudden light. Still that voice might itself have been uttered, as the Spirit began to move upon the face of the waters; and that movement, as already interpreted, might have brought out the answer to the call. But why need we be so literal in the interpretation of this passage? Why insist upon it that there was an audible utterance, a vibration of an atmosphere, induced by the exercise of vocal organs like our own? Why not say that God's word in this case was simply his will, a word uttered in his heart, but not pronounced, as if there were an ear like ours to hear it? He willed it, and it came about. He determined that there should be light and there was light. But whether that determination were vocally uttered, or whether the light brake out instantaneously, we do not know. Neither is there anything in the narrative to compel us to believe that light came miraculously. It were just as perfectly in accord with the record to say that it might have sprung up, under the interplay of those natural forces, so called, which the Spirit of God communicated to the dark and nebulous mass, when he moved upon the face of the waters.

Perhaps a more common view of the coming of the light is that which puts it at a later date. It supposes that our planet has long since been formed, and has passed through some important stages of its history. But clouds hang thick in all the air, and the world is utterly dark. And this voice which brings in the light simply clears the air of its vapors, and allows the sun to illuminate the earth, though there is still a sky so far clouded that the

sun cannot yet be seen. This very nearly is the view of Hugh Miller; but the work seems to have been done earlier. And in support of the theory above elaborated, we set against the authority of Hugh Miller the able scholarship and sound reasoning of Professor Guyot.

The case viewed in the light of physical science, then, is this. The original condition of all *nebulæ*, at least hypothetically, is dark; and although a dark nebula might well be supposed necessarily to elude observation, facts are not wanting, showing that such objects perhaps exist and can be detected, even at the present time. Thus Professor O. M. Mitchell says that there is a spot in the cluster Orion, which is "intensely black," and which he says "appears an absolute vacuity." And he adds that in exhibiting the great light nebula in this cluster to persons who have never seen anything of the kind, the remark is frequently heard that "a part of the nebula is hidden by a black cloud."*

Here, then, we may suppose are two *nebulæ* in the same part of the heavens, the one of which has become luminous, and the other of which has not yet reached the light stage. So was it with the great mass from which God formed our system. At first it was a dark nebula. Later it became luminous. That is, under the influence of gravity and motion, developing chemical combination and electrical action, light appeared. At first it was faint, like the mild phosphor of the decaying tree stumps, showing itself in the dark only. But later it became brighter; and it still burns on. It came by process of natural law, but none the less was it the creation of God. His word,

* "Planetary and Stellar Worlds," page 331.

or what is the same, his act of will, brought it out. He planned for it. He ordered it. And, if we must believe that there was literally a spoken word, then was it, after all was ready, that the word was uttered. Gravitation had been working slowly on for ages, condensing the great mass, and bringing atom into conjunction with atom. Chemical and electrical energies had been developed to the very point of ignition. The train was laid; the fuse was ready; and then the word was given and the thing was done. "Let there be light," said the word; and all through that heaving mass a faint aurora ran. It grew brighter and brighter, as morning dawns toward noonday. It blazed a glorious corruscation, amid the sombre spaces, where it hung; and the glory was seen afar. That was the beginning. The light after that never went out. It was modified in its character; it came from other sources; it was centred in narrower spaces, but it only increased in intensity till it blazed in awful splendor from all the stars and suns.

This solves the problem of the creation of light before the sun appeared. Once this was the great puzzle in the story of creation; and there were not a few fain to urge the objection that here Moses had made a mistake. See! he has forgotten himself, they said. He creates light, and yet there is no sun till the fourth day! But Moses did not forget himself; nor did the Spirit who guided his hand forsake him at so critical a point in his story. And so it happens that, after the infidel has had his laugh over the blunder in this narrative, lo, it turns out that there has been no blunder at all. That there should be light before the creation of the sun is exactly what the nebular

hypothesis, that latest grand conception of science, demands. Had Moses said that there was no light, until the sun was created, he would have shown himself a bungler. A man not inspired would almost certainly have made that mistake; for until the working out of the nebular hypothesis, that was the common opinion. But not so with Moses. Somehow he was kept from committing himself to the common error. Somehow he was led to describe the appearance of light, long before there was any sun to shine upon the earth. The Spirit of God began to move; and immediately the call came. Then light appeared, though it was not till long afterward that there was any such thing as a sun in our system. There, exactly, he hit the mark; and we could not assign any other place for the beginning of light in the universe without contradicting the facts in the case, as given us in our more recent scientific discoveries.

In the thirty-eighth chapter of the book of Job there is an intimation that the angelic host were interested spectators of some of the phenomena of creation. And if such were the case, one would say that their interest might well reach its height when light sprang up. One imagines those beings, watching the incipient work, with their keen intellectual faculties, to which material darkness presents no obstacle, until all is ready for this great change. They perceive those wide vortices in which are outlined the first movings of the cosmic matter. They mark those enfoldings and breakings up of the extended mass. They observe the new forces developing in it, and the life with which it is becoming pregnant. They are waiting and expecting. Everything begins to portend

some change; when, suddenly, as a spark might kindle in a magazine, a glow runs through the whole. As they look, it brightens. In a little while it is one ineffable blaze. They have known something of light, for it has always been shining about the Throne; but this, as creating for God a new glory, raises their minds to the pitch of ecstasy, and they cannot restrain their praise. Somewhere, quite early in this world-building, there was joy among these heavenly hosts at what God had done. Perhaps it was here. Perhaps this is the very moment to which God himself refers in speaking to Job, when he says, "Where wast thou, when I laid the foundations of the earth . . . or who laid the corner-stone thereof, when the morning stars sang together, and all the sons of God shouted for joy?"

The statement that God divided the light from the darkness is added to the account, as indicating either that the light period now began, as distinguished from the dark period preceding; or perhaps meaning that the light mass now began to have definite outline, and so to be separated from the dark spaces around it. The division was, in fact, one of both time and space; and the statement can be applied as well to the one as to the other.

It is also added that he gave both the light and the darkness a name. The light was called Day; the darkness, Night. This naming things, as they are created, continues to the end, when he names Man. The creator of a thing claims this right. He gives a name to the thing he forms. And so God, who creates the light, gives it this name, Day. Just as men will afterward call their short periods of light day, and their short periods of dark-

ness night, so God calls the first light period, extending over perhaps millions of our years, Day; while the preceding dark period, extending back to his own eternity, it may be, he calls Night. From this great Night and Day of God, man names his little night and day, as marked by the revolution of our globe. And it is of God's measurement, and not of man's yet, that we must make account in the additional formula for this work—"and the evening and the morning were the first day." Man has not yet appeared. Our globe has not yet been solidified or even separated from the parent mass. But a distinction of light and darkness has been created; and that distinction will continue to the end. Now the light is for the one great mass of cosmic matter. Now it is for a duration that measures deep into eternity. By and by there will be subdivisions; and both time and space will be parceled out in such proportions as can be grasped more easily by the mind of man. But in this part of the story, at least, the light and the darkness, the evening and the morning, the Night and the Day, are set to that broad measurement in which one day is as a thousand years, and a thousand years as one day.

CHAPTER XII.

THE LIGHT A BLESSING.

“AND God saw the light that it was good.” It not only rejoiced the angels, but the Creator himself took pleasure in it. He was building a home for intelligent beings ; and although this light shone out, long before there were any such beings on our globe, he saw from the first what important offices light would serve, and with how much beauty it would adorn the universe which he was now creating, and he pronounced it good.

We can scarcely conceive what this world of ours would be without light. Even if everything else were here which we now enjoy, pervading and universal darkness would make it an unfit abode for beings like ourselves. We can best conceive of such a condition of things by supposing the human family to be all smitten with blindness. Without light we should be blind ; and how a race of blind men could subsist here, we can not easily understand. The forests might still wave on the mountains ; the grass might still carpet the pasture-grounds ; and there might be fruits and meadows and wheat-fields ; but a race without sight would soon perish in the midst of plenty, or eke out a miserable existence scarcely above that of the beasts.

But, without light, most of the things we now enjoy would not exist in this world. There would be no vegetation, or next to none. And if there were any great change in the order of vegetation, the entire character of the animal world would be changed also. Some of the lower orders of animal life might still exist, but there would be none of those creatures which are most useful to man. And had human beings been placed in such a world they would have been at best but a sad and sickly race, almost literally worms of the dust, even though they had been as now endowed with immortality.

So, for whatever our world is as a home for man, and for whatever man is and enjoys above the possibilities of such a worm-like condition, we are indebted to God's gift of light. In the light is it that our brilliant insect tribes balance their quivering wings and send out upon the air the music of their busy hum. In the light is it, especially in the intenser light of the tropics, that our birds are clothed with a plumage of gorgeous coloring, and pour forth their songs. And under the light is it that the beauty and the grandeur of this terrestrial scenery unfold themselves in successive pictures, overhung by the great dome of sky.

Nor is it in such things alone that light is good for man; but as perpetually bathing him in new life-powers, and furnishing him a tonic that is unconsciously absorbed every day into every pore of his system. Those unfortunate people who are much excluded from the light, the poor wretches that live in the low basements and underground apartments, rear a sickly progeny, and are the first to fall victims to any sweeping pestilence. The sun-side

of a hospital is the side most favorable to the convalescence of the inmates ; and a strong sun-bath is sometimes worth more to a wasting invalid than either food or medicine.

Light ministers to our sense of color ; for color is only light variously distributed. The tints of the landscape are but so much reflected light ; and it is the same with the fleecy cloud that floats in deep heaven, and with the ever-changing hues of the restless sea. The sparkle of the stars at night, the incoming of the tender dawn, the full blaze of noontide when such floods of radiance are poured from the golden chalice of the sun, and above all, that gorgeous canopy of cloud with which the king of day curtains himself in, as he sinks to rest—all these are but so many exhibitions of this one element of life.

A wondrously etherial thing is this ; and yet man has learned to handle it. It is the element by which mainly he gives expression to his own idealizing. All statuary, all architecture, and most of all, all painting, stand revealed only under its magic touch. Nor would the human form itself be arrayed in its perfect beauty, except the light fell upon it. "We are all of one color in the dark ;" and the flashing eye of beauty, the fair cheek of maidenhood, and the sweet and holy calm that sometimes sits upon a countenance crowned with gray hairs, would all be lost to this world except for the agency of light.

Light has a special office of revealing unto us things that are afar off. Sound is its only parallel in this particular ; but light so far outreaches sound as almost to throw it out of the comparison. Sound travels with great rapidity, and reaches us from vast distances, along the surface

of this globe ; but light reaches us from other worlds, and reveals to us what is going on in other systems. This office of light is turned to infinite account. A great lantern set to shine from some headland of a rocky coast sends tidings to the mariner, and warns him off from the place of danger. And a brighter lantern, hung up against the north pole, gives him his reckoning, after tossing for weeks it may be upon the wide main, with no friendly shore in view. A swift-footed messenger is light, bringing us intelligence from the remotest spaces in an incredibly short period of time. A rail-train, at best, will run perhaps 60 miles an hour : but the light-train comes in with tidings each day at the rate of 195,000 miles in a single second of time ! It will bring you to-night, from the planet Jupiter, news not more than ten minutes old : it will lay at your door, if you will be there to get it, a dispatch just as fresh from the sun to-morrow morning.

And we are learning how to read these dispatches. We furnish a long hollow tube with a glass or two ground into peculiar shape, and turning it toward the heavens, it reports wonders. There are feculæ on the sun's disc. Jupiter balances a system of satellites that make their regular journeys round the planet, as the planet itself does round the sun. And Saturn hangs aloft with other satellites and a strange appendage of rings, while whole armies of unknown stars come trooping in upon the scene from out the depths of distant space. We call the instrument which brings all this to view a telescope.

And there is another instrument of later invention by which we read still more wonderful things in the light. It is a kind of prism, and as a sun-ray falls through it the

primary colors are laid out in separate places ; and across these colors curious lines are seen passing. These lines may be compared to the dots and scratches of the telegraphic alphabet ; and they can be read quite as distinctly. They tell us what is the chemical composition of the object from which the light comes ; or what substance that object is made of. It comes from one object, and you look at the writing and read "Hydrogen : burning hydrogen." It comes from another source and the word is "Thallium : burning thallium." And once more you try it and the word is "Silver : pure burning silver." It makes these reports from the fires which the chemist kindles in his laboratory ; and thus we learn the alphabet. Then we try it upon the lights which God has set burning in the far-off heaven, and read by the same alphabet the composition of the stars and the sun. The distance makes no difference. In either case the handwriting is plain.

These are some of the things which light can do. We might explore this field much farther, and find new wonders still. But we have seen enough already to understand why the record should be made, when this element first appeared, that God saw the light that it was good. He saw then what light was capable of, and what it could do for our world. He knew exactly what it would do for us, what we should learn from it, and to what uses it should be put. He had in mind all the changes it should pass through, from its first auroral dawning in the nebula till the planets should be formed and the sun should begin to blaze upon them.

He made light a symbol of moral excellence and a type

of joy. "Light is sown for the righteous and gladness for the upright in heart." He himself dwelleth in light, and all who trust his Son and do his will are promised a home in that world of which it is said, "There is no night there; and they need no candle, neither light of the sun; for the Lord God giveth them light, and the Lamb is the light thereof."

CHAPTER XIII.

THE CREATIVE DAY : EVENING AND MORNING.

IN six days the Lord made heaven and earth, the sea, and all that in them is, and rested the seventh day.* So reads the condensed record of those matters over which we are now passing. And, in comparing God's Word and his work, we come upon the question, What was the measure of these days ?

We are accustomed to use the term *day* to indicate a period of just twenty-four hours ; or restricting the term still more we cover with it that time which elapses between opening morning and the coming in of night. These are the more common uses of the term ; besides which it has a kind of tropical meaning, of rather vague sort, as when one says "Not in your day," meaning not in your life-time. When we undertake to be very strict in the use of this term, we usually confine it to one revolution of our planet ; and as we are inclined to be very strict in the interpretation of Scripture, it is not strange perhaps that we have been accustomed to give the term this limited meaning in reading the Story of Creation. We are reading God's Word, here, we say ; and we must

* Exodus xx. 11.

be very careful not to indulge in any fancies about it. It means what it says : and when it says six days, it means *six days*.

So the opinion has grown up that the Bible teaches that each of these creative days measures just one revolution of our planet, or twenty-four hours by the clock. And this view has by many been regarded as so completely settled that it is little short of outright infidelity to question it. The consequence has been that something of skepticism has risen among scientific men ; and they have asked whether a book that gives us a cosmogony of that description can be inspired. Believing that the book has been correctly interpreted, and accepting the statement that it teaches that creation was wrought out in six solar days, they say, "Something is wrong here. Creation was a work of immensely greater duration." Professor Tyndal, in the preface to the seventh edition of his Belfast address, says, "The book of Genesis has no voice in scientific questions. To the grasp of geology, which it resisted for a time, it at length yielded like potter's clay ; its authority as a system of cosmogony being discredited on all hands by the abandonment of the obvious meaning of the writer."*

What then was the meaning of the writer of this book ; and is the "obvious meaning," as Professor Tyndal calls it, the real meaning? Must we hold ourselves here to the strict construction of the term day, as a period of twenty-four hours ; or may we believe that the inspired writers were all in the habit of using such terms in a broad and tropical sense, and that, like other men who

* Page 14. Appleton's Edition.

write under a strong and impassioned impulse, they often dashed off their sentences with a perfectly free hand?

We have the book of Genesis in a translation. A few scholars read it in the Hebrew, but for the most of our English-speaking race, and probably for Professor Tyndal himself, the English version of this book *is* the book. But a translation is very liable to be colored unconsciously by the preconceptions of the translators. And, as the book of Genesis was translated into English before the science of geology was broached, and before any person living had any idea of the immense duration of the creative periods, it is not strange if the translators gave the word *day* an improperly restricted meaning. It is quite certain that those men, honest and capable as they were, believed the creative periods to have been days of twenty-four clock hours each; and it is equally certain that this preconception modified and somewhat marred their usually faithful work.

These men came upon the word *yom* in Hebrew, and said, The equivalent of that word in the English is day. And, as they were handling God's Word and must be very cautious, they put upon that word the strict and narrow interpretation which confines it to a period of twenty-four hours. And as they came upon another phrase which assigned an evening and a morning to each of these days, they made it read as if such evening and morning constituted a day. Hence the words, "And the evening and the morning were the first day;" which is not a good translation, but a gloss cast upon the passage, unconsciously, by the preconceptions of the translators.

Among the Hebrew people the solar day began at even-

ing; and it seems to have been supposed by our translators that the phrase, "the evening and the morning," was intended exactly to measure that day. But not so do we find it. The evening and the morning did not constitute a Hebrew day; for the word morning, with that people, even as with us, ran out and expanded itself before noon; whereas their day ran on six hours further, covering all the afternoon and not closing until sunset. When a Hebrew wanted to measure a day he sometimes said "from the even unto the even," but he never said that an evening and a morning made up a day. No such case can be found in sacred Scripture. It is an utter mistake to suppose that Moses here intended by the words evening and morning to measure a solar day.

Rev. Dr. Murphy of Belfast, though himself holding still to the traditional theory of creation in six solar days, corrects one translativè line and gives us the true rendering of the passage we have in hand. His reading is very strict to the letter of the original and is as follows: "Then was evening, then was morning, day one!" Here word answers to word. Here is as close and literal a rendering of the famous passage as the diverse structure of the two languages will allow. But is this at all a statement that an evening and a morning constituted this day? Moses does not say so. His translators say it; but that is a responsibility they assume for themselves; and if Mr. Tyndal means what they say, when he speaks of the "obvious meaning" of the writer, he would do well to familiarize himself with the language in which the writer spake. All that Moses declares in this passage is that for each of these days there was an evening and a morning; or, in

other words, that each successive creation was a dawning out of the previous darkness and disorder. His statement has its parallel in the word of the apostle Paul, in 1 Cor. iv. 6, where he speaks of "God who commanded the light to shine out of darkness." So, says Moses, rose these wondrous days. The first dawned from the darkness of original chaos; the others dawned from the remaining chaos. Each was a new morning rising upon an unfinished world.

When therefore we read the words "And the evening and the morning were the first day," or were "the second day," let us remember that this is not the "obvious meaning" of the writer at all. For that statement he is in no way responsible. Let us remember that an evening, and a morning did not make up a Hebrew day; and that the mention of the evening and morning here is not intended to give us any measure of time whatever. It is simply a statement of fact. It is part of the general account of creation. It was something worth recording that creation occurred by successive dawns; that each creative period was an uplifting of the globe out of chaos into order, out of remaining darkness into the coming light of a finished work. Whether one of these days lasted for twenty-four hours or for twenty-four thousand years is a question on which Moses gives no opinion. He absolutely avoids that subject. Or he virtually says, I have no statement to make. And if we are so foolish as to tie ourselves down to the solar day theory, in the interpretation of his words, we deserve all the ridicule that scientific skepticism can cast upon us. Quite enough is it if we abide by the simple word which God has caused to be made.

CHAPTER XIV.

THE CREATIVE DAY: CONFIRMATORY.

WE are not studying science just here, but interpreting Scripture; and we cannot too carefully and constantly remind ourselves that whatever light the works of God may cast upon his Word, our business as interpreters is, first of all, to inquire for the plain, honest meaning of the record. To make up a theory how that record ought to read, and then to impose that theory upon it, is at once to be wanting in respect for Holy Scripture and in candor with ourselves. We have examined one passage somewhat critically, which has been supposed to teach that each creative period was a solar day, and have found that it has no such meaning. It will be the work of the present chapter to examine other portions of the Word that may seem to have some bearing on the same question.

The attempt to restrict the word day to any one meaning in Scripture must always prove a failure; for it is used in several ways. Of this we have ample illustration in this very account of creation. Thus, it covers a creative period, whatever that may be; as in the phrase, "The evening and the morning were the first day."

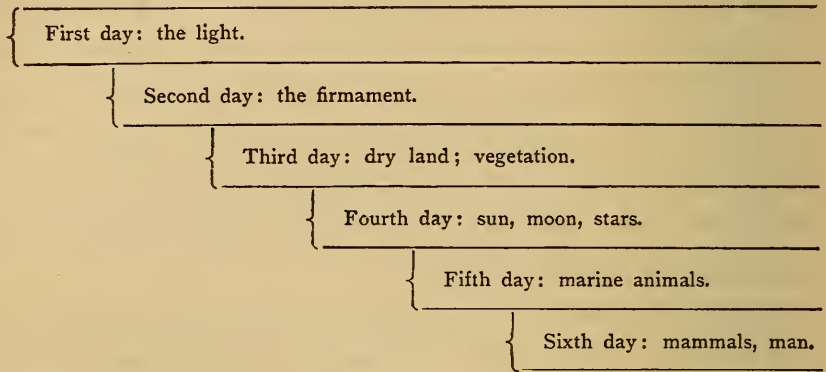
Then, as in Genesis i. 5, it simply embraces the period of light, whatever that may be; for God called the light day; and the darkness he called by quite another name. And to sum all up, the entire six creative epochs, whatever they may have been, are called a day, as in Genesis ii. 4, where we read, "These are the generations of the heavens and the earth when they were created, in the day that the Lord God made the earth and the heaven." So reads the record. A creative period is called a day; a period of light is called a day; and the whole six creative days are grouped in one, and called a day. Why should we restrict ourselves to a single use of this term, and that a very narrow and questionable one, when the narrative in which it occurs presents it with at least three meanings?

Another circumstance merits thoughtful attention. If the story in Genesis teaches that creation occurred in six solar days, it stands alone in that respect in all the Bible. The bearing of the Fourth Commandment upon the subject will be discussed presently; but leaving that out of view, we may safely challenge those who hold the solar-day theory to show a single passage in Holy Writ, subsequent to this original history by Moses, that makes the slightest allusion to the views they hold. This is quite remarkable. Creation is a theme to which the sacred writers often recur, and on which they dwell at great length. The poetry of the Bible is especially full of it. In the book of Job there is a whole chapter devoted to it; and in the Psalms and in Isaiah the wonderful theme is taken up again and again. But you look in vain in any of these writings for any hint of the six solar days. Such

tremendous swiftness of action, on the part of the Almighty, as that would involve, would have been seized upon by any one of these writers when he was wrought up with his theme; but not one of them seems to know that any such thing occurred. And if we go back again to Moses, he so tells his story that at any rate until the fourth day there is no possibility of reckoning by solar time; for until that day there were neither sun nor stars to mark the passing hours.

Moses, so far from measuring these days, leaves each one of them unfinished. He begins in each case with the "evening" out of which the day sprang, carries it up till its "morning" is well established, and leaves it there. He in no case continues his account of a day's work through to the end. He gives the partial darkness out of which it dawned, and speaks of the morning which constitutes the dawning, but he does not go on with it to the following evening in which it closes. So far as his narrative shows, these days may run on in part quite parallel, the one with the other. The second may begin before the first has ended; and the third may begin before the second has closed. And we shall find, as we pursue this study further, that such was the case. As one man's life, which we call "his day," may overlap another man's life, which we call "his day," so one of these times of creation which we call a day may for a long time be parallel with another which we also call a day. One of them is started and sent forward; and then another is started and sent forward side by side with it. And, for aught that appears in the narrative, the whole six days, though beginning successively, may have for ages moved on side by side,

the one keeping even pace with the other. The method of this movement may be represented as follows :



The light-making begins, but is not completed till a firmament also begins ; and while the firmament is preparing, the dry land begins to appear, and vegetation to spring up. But both the upheaving of the dry land and the upspringing of vegetation are in process when the sun first shines on the earth ; and the creation of marine life begins almost immediately after vegetation appears, and a long time before all the new orders of vegetation are complete ; and so through to the end. The successive creations are successive only as to their "mornings," or their beginnings. One stands close behind the other ; and they are going on side by side at the same time. So Moses leaves it. He closes no day's work by saying, "Then came evening." He opens the morning, and then starts the next day at its side.

On the solar-day hypothesis, what could we do with the first of these days ? The great proof-text on which that hypothesis rests is, "And the evening and the morning were the first day." That is, say those theorists, The period of darkness, or "evening," preceding, and the period

of light, or "morning," following, constituted the day. And as in a solar day there are but twenty-four hours, about twelve hours of darkness only could be reckoned into each day. But how was it with respect to this "day one"? How long a time had darkness reigned before God said, Let there be light? Had it been only about twelve hours? Had the *tohu* and *bohu* continued only for that brief space of time? What bold literalist has ever dared say as much as that? When they begin to reckon the six days, they commonly assume that our planet was at the time a kind of wreck; but on that supposition, how long had it been a wreck? Only about twelve hours? If not, then what becomes of the solar-day reckoning for this first day? That day, according to these theorists, takes in the darkness preceding the first twelve hours of light; and that darkness, as they themselves must allow, had endured for ages. Here, then, is a day, standing at the head of the whole series, that can by no contrivance be reduced to the proportions of mere clock time: the "evening" alone, which they reckon with it, was a long period; and so the day itself was long.

So we find it with the first day; and if with that, who shall institute a new measurement for the second or the third. The fact is, that the solar-day hypothesis, ranked by its advocates as if it were above all the scriptural view of the case, breaks down at the very start. And whatever else may be true, this is beyond question: that if the first day embraced the evening and the morning, it covered ages of duration, and was no mere twenty-four hours of solar time.

CHAPTER XV.

ARGUMENT FROM THE SEVENTH DAY.

WE have seen how impossible it is to reckon the first creative period as a solar day ; how will the case stand, if we take up the rest-period, the seventh day ? The six preceding days had each been characterized by what it brought forth. On each of these days God had performed some creative work. But this seventh day, in high distinction from the others, was marked as the day when God rested from all his work which he had created and made. Each of the work-days once begun was continued for a time, the work continually going forward. Then came in the rest-period, when for a time creative energy was to be arrested, and no more new forms of matter or of life were to be brought forth.

Well, so nearly as can now be ascertained, this rest-period was ushered in at least 6,000 years ago. Up to about that time, both in the vegetable and in the animal world, new forms of life were produced. But since that time, if any new genus or species, in either the animal kingdom or the vegetable world, has appeared upon our planet, the record has not been preserved. The work-days reached up to that point ; but then came in the rest-day. Since then God has rested from all his work which

he created and made. Since that the rest-day, God's Sabbath, which is the great Seventh Day of the cosmogonic week, has continued. That day has been at least 6,000 years long; perhaps much longer; and for aught we can say, it may continue 600,000 years more. So the great week concludes as it began, with a day very much more than twenty-four hours long. As the first day of the seven, including both the evening and the morning, must have continued for ages, so the last day of the series must be reckoned by the same broad measure. And if the series begins and ends with a day that is so great, by what process of reasoning shall we apply the shorter reckoning of solar time to the five days that lie between? It cannot be done. The attempt would involve an absurdity.

It tends to strengthen this view of the case to observe that the seventh day embraced no period of darkness preceding. For the first day there was an evening out of which the morning dawned; and it was the same for the second day and for the third, and for each of the six on which creative work was done. That is, each of these days rose out of some remaining darkness, or chaos, which was reckoned the same thing. For each of these, the world lay unfinished yet. Something of chaos was still here; and chaos, to a Hebrew mind, was always associated with night. But, as these days dawned one after another, the light shone brighter and brighter, until there stood before the Almighty the grand spectacle of a finished world. Then creative power was arrested. Then the work-days all ran out, and the rest-day began. And this new morning rose out of no chaos, or evening, but commenced with

everything at broad noon-day. So, when the order was given to write the record, it was in effect this: Say not "there was evening and there was morning," now. This day begins under the full sunshine of a finished world!

People who "keep Saturday night" generally make great account of it that the Jewish Sabbath began at sunset; and often quote the text, "The evening and the morning were the first day." But if we are to judge of our human Sabbath by the order of things on God's rest-day, we should say that it takes in no previous evening at all. The six work-days, indeed, each rose out of an evening; but the rest-day did not; and it is nowhere said in this story that the evening and the morning were the seventh day.

There is one clause in the Fourth Commandment which we must not pass without notice. "In six days the Lord made heaven and earth, the sea, and all that in them is." All that in them is—so says the Word. Well, there are some things in the earth, particularly in the rocks, the creation of which no man in his senses will assign to a week of six solar days. There are fossil remains of creatures which even the solar-day theorists admit must have been successively created during long ages. Their notion puts all such creations previous to the six days, and supposes the sacred writer to begin his story after those creations have passed. Not the fossil remains, they say. Moses gives no account of them, whatever. He only tells us how our world was reconstructed about 6,000 years ago. But, quite unfortunately for a class of people who pride themselves on holding Scripture to a literal construction, Moses says "heaven and earth, the sea, and *all*

that in them is." This includes the fossils; and if the six days' work included these, then it covered a good deal more than six days of solar time.

There was an age when a crustacean creation prevailed; and judging by the rocks deposited during that age, it extended over thousands of years. Then came the age of the fishes; then that of the reptiles and the birds; and still later the tertiary age, when we get the mammals and man. Along-side this creative day ran another in the vegetable world. The lower orders came first, and the earth brought forth grass. Following this came that overwhelming growth, the product of which is laid up in our coal-measures. And still later came the timber-trees, and fruit-trees needed for the use of man. The remains of all these successive creations lie to-day embedded in the rocks; and to say that God made heaven and earth, the sea, and all that in them is, in six days, means that his six days extended down through all these ages. No one believes that all this was done in six solar days. But that it was all done in God's six days is too plainly declared to be questioned. The solar-day theorists are very strict literalists in the interpretation: what will they do with the phrase, *all that in them is*?

CHAPTER XVI.

OBJECTIONS.

AS this view of the six days has not long been the common one, it is very natural that the question should be asked, Why was not all this discovered before? We never heard anything about six great creative periods until the science of geology came out, when all at once people began to discover a new meaning in the Bible. This looks very much as if our interpretation had been contrived to meet an exigency. It seems not so much a result of the careful study of the Word as an invention to escape those difficulties with which we are pressed by men who have familiarized themselves with modern science.

To this, however, it may be replied that a right interpretation of any portion of Scripture frequently depends very much upon the fact that particular attention has been called to it. And where there has been nothing especially to set us upon the study of a passage, we sometimes carelessly give it an erroneous construction which at last becomes traditional, and so passes down from age to age. Hundreds of illustrations of this statement might be given, and one of them comes in exactly here. The traditional interpretation of the first chapter of Genesis made these

six creative periods solar days ; and, until there was something to call attention to the subject, that view of the case generally prevailed. When, however, the science of geology was wrought out, and that view was challenged, scholars once more took up their Bibles and began to study ; and the more carefully they studied, the more thoroughly were they satisfied that the traditional interpretation was erroneous. We saw our mistake as soon as our attention was called to the subject.

It is not true, however, that the views here presented are entirely modern. Questions of interpretation were started, with respect to these six days, nearly 1,500 years ago. St. Augustine, less than 400 years after Christ, and of course long before any such thing as the science of geology was thought of, sat down to the study of this chapter, and, observing that three of those six days came before the creation of the sun, exclaimed, "What mean these days ; these strange sunless days?" And until this time his question remains unanswered, as it is unanswerable, by those who regard all those days as measured by solar time.

A stronger objection, however, is sometimes urged on the ground of geological science itself. It is set against the alleged number of these days, and may be stated as follows : "Do you say then that there were six creative epochs ? Has geology divided off this story of creation into exactly six equal parts ? Are the geologists even agreed among themselves, how many creations there were ; and do not some make it as many as thirty, while others reduce it to one, even if they allow that there was any creation at all ?"

To this it may be answered, that with the exception of a few persons, represented by such names as that of Mr. Charles Darwin, geologists agree that the creative work extended over a long period, and embraced a large number of successive creations. Very few indeed would undertake to say that there were just six creative acts ; and some might say there were sixty. But all will concede that the six days outlined by Moses are sufficiently comprehensive to embrace the whole. The many creations indicated by geology admit of a sextuple grouping ; and that grouping, being convenient for the purpose of the narrative in Genesis, was adopted by the inspired writer. Had he chosen he might have made some other grouping, or have counted each creative act a day, and so have made no grouping at all ; but he chose another method. He took up the light-making process and called it one day. He took up the space-making process and called it another day. He took up the double process, the uplifting of the continents and the production of vegetable life, and called that another day. And so he went through to the end. This simplified the story ; and, in thus numbering the six days of God, he created for us a pattern for our human week, with its regularly recurring Sabbath ; and this has been found of great importance to our race. God grouped his great work into six great days in this story, as he wants man to group his lesser work into six lesser days, always to be followed by a day of rest. He might have given another number, both for his week and for ours. He might have given five, or ten, or twelve ; but six seemed to his wisdom the best. The sextuple grouping covers the ground. The sextuple grouping creates our week. And

if any other grouping had been made, it would have been open to the same objections that are alleged against the grouping as we now have it. It was as well to put the picture in a frame with six sides as to set it in any other way.

The difficulty found in the relation of this view to the Fourth Commandment has already been substantially disposed of. God's days in that commandment are one thing: man's are another. The days of his creative work are like himself, broad, deep, immeasurable. Man's days there spoken of are like himself, narrow, limited, one succeeding another, and the same repeating itself many times. And the argument of the Sabbath law is this: God the Creator wrought upon his work through six great days, and then rested. In like manner, let man in his lowlier sphere have six days of toil to one of Sabbath rest. He will find it in every way best for him. He will be more prosperous in his worldly affairs; and he will secure the time he needs to think about the world to come.

Here with entire confidence may we rest the case. On this interpretation we can safely take our stand. The science of geology may be greatly modified, or may even be quite driven out from the world. But the interpretation of the first chapter of Genesis can never be put back where it was before attention was called to the study of the creative day. Not because any exigency has forced the interpretation upon us; not as a contrivance to escape a difficulty in which the "obvious meaning" of the passage involves us; but because, irrespective of every other consideration, our study of the Word brings us to this conclusion, we declare that the word "day" in the first

chapter of Genesis can not be limited to a period of twenty-four hours clock-time ; and that the six creative periods there indicated are not six solar days. Geology, however, is not likely to be driven out of the world nor greatly modified ; and as the science shall be better understood, and the Bible more carefully interpreted, we shall find that the two records are in perfect agreement.

CHAPTER XVII.

THE FIRMAMENT.

IT may be fairly questioned whether the distinction we make between the operation of natural causes, and the exercise of the divine power, is not based upon an error. For in the last analysis every operation of nature resolves itself into "the act of God." Thus, we have no better way to account for the fact that the sun attracts the earth, or that the earth attracts the moon, than to say, "God wills it." We may call the sun a magnet, and the earth a lesser magnet; but that explains nothing; for we have yet the questions to ask (1), How came it to be a magnet? and (2), Why does a magnet attract? So of the law of crystallization; so of chemical affinity; so of the vital principle; all these rest primarily upon the will of the Creator; and so, all the natural effects of the interplay of these laws may properly be ascribed to God. Nevertheless, it is convenient to distinguish between God's action through second causes, and his action without such cause; and so we call the one nature and the other the supernatural.

And if such a distinction is admissible at all, it certainly has a place in the present discussion. For the work of creation, as represented by Moses, though ordered

entirely of God, yet appears also, in no small part, as occurring under natural law. As to certain particulars, indeed, that work stands entirely within the sphere of the supernatural, and is best described by saying in bold, strong terms, God did it. As to other parts of that work, it was just as plainly a simple operation of nature, and is an act of God only as the sending of the rain upon the earth, or the growing of the grass upon the mountains, is also the work of his hand.

We have observed this already. The origin of the universe was by direct act of God. In the beginning, he produced the cosmic matter, of which the worlds were made. This occurred by no process of nature; for nature had not yet been framed. And so was it when the Spirit of God moved upon the face of the waters, and this dead mass was impregnated with life and made to give forth light. But when once this matter had been created, and those laws had been established which we now observe, very much of what followed would be a matter of course. God would still be the doer of it, indeed but only as having set in motion a train of causes which produced the result.

It is a pity this had not been better understood; for just at this point have occurred some of the sharpest of those conflicts between Science and Religion, which are one of the special features of our times. The naturalist discovers that certain things, which we have always been accustomed to ascribe to the direct interposition of divine power, have been simply the ordinary ongoings of nature; and lo, we turn around and call him an infidel. The rain is no miracle, he says: it comes by the natural process

of distillation. The thunder is nothing supernatural : it is all traceable to the electric fluid. And we lift up our Bible and declare that it is not so. Quite naturally, he retorts upon us, "Then your Bible is not true ; and, if you will have it so, infidel I am." So the quarrel goes on ; whereas, everything might easily be adjusted, if we would come to a proper understanding of terms.

It is a peculiarity of the Bible to show us God in everything. He bringeth forth Mazzaroth in his seasons. He guideth Arcturus and his sons. He sendeth his rain upon the just and upon the unjust. And when the thunder roars, "The voice of the Lord is upon the waters." All this is ascribed to him as distinctly as is the dividing of the Red Sea for Israel to pass over, or the calling up of Lazarus from his sleep in the grave. Nature and the supernatural are here all blended in one. And, in this history of creation, as elsewhere, things are again and again ascribed to him, which were as clearly an operation of nature as is the rising of the sun.

We have this illustrated in the work of the second creative day. On that day the firmament was made. It was the work of God's own hand. But whether it were created by a divine interposition, producing results which nature never would have caused, or whether it were wrought out under natural law, the record does not decide. As we carefully study the subject, we shall perhaps be disposed to say that the firmament was made in the second of these two ways ; and so, perhaps, we shall be able to give a natural history of this work, showing how it all came about ; but none the less is it a work of God. That is the way God generally works. Interruptions and inter-

positions are the exception, not the rule. They constitute miracles and supernatural occurrences ; but for the most part God does his pleasure without in any way disturbing natural law. We shall understand the case better, however, if we pause for a moment and inquire again into the meaning of the terms we employ.

God made the firmament: what was it? The word is rendered in the Septuagint by the Greek term, *stereoma*, which signifies something firm or solid ; showing that the translators supposed the firmament to be a solid thing. In the Latin Vulgate the word is rendered *firmamentum* ; showing that the same idea still prevailed. And our English translators, almost literally copying the Vulgate, wrote for us the word firmament, showing that they also regarded the product of this second day's work as a solid thing. In this they simply accepted a very prevalent view. The idea was very generally entertained that the sky formed a solid vault above the earth ; or, rather, that the sky above and that below formed a kind of double vault or hollow solid sphere, in the centre of which stood our world, and beyond which was the heaven of the gods. All these several translations of the Bible were colored by that view. When Moses spake of the sky, the supposition was that he referred to a solid vault ; and so they translated it "solid vault." But when we come to ask for the term he uses, we find it to have no such meaning. He does not say *stereoma*, nor *firmamentum*, but *rakiah*, which is a Hebrew term derived from the verb *raka*, to expand. His translators, prepossessed with the idea that the sky was a solid vault, called it by that name ; but Moses simply called it an expanse.

A very remarkable circumstance, this! Had Moses, in writing his book, been left entirely to the guidance of his own mind, he would inevitably have been led into the same error that his translators committed after him. He would have taken up the common conception of the solid vault above us, just as they did; and would have used a term expressing it. What kept him from doing so? How happened this man, living in times the most primitive, to rise above the error of men who lived at so much later a day? How came he to choose the very term which would express the facts in the case, while his translators, with the record as he made it, all before them, were so prepossessed with a false science that they blundered, mistranslated, and used a term indicating that the sky was solid? How came he, in an age when no man knew what the sky was, to use such a carefully-chosen word in describing it, that when modern science should make its last discovery in this direction, we should come right back to the language he employed? This, in the language of Professor Waring, in his recent able treatise on this chapter, is "The Miracle of To-day."

CHAPTER XVIII.

SPACE - MAKING.

IF the nebular hypothesis be accepted, we must believe that the time came at length when the original mass broke up and formed a large number of detached nebulæ. One of these nebulæ was subdivided, and formed those stars which combine to compose the Milky Way; one of these stars being our own sun. Others of these nebulæ, some already formed into stars, but too distant from us to appear as such except by means of the most powerful glasses, others only in process of forming stars, are seen in the outlying regions of space. The detached mass with which we stand connected thus became a thing by itself. It lay in its place, an immense disk or wheel, the general outline of which may still be traced in the arrangement of the stars forming the Milky Way. But the qualities imparted to it, and the motions generated in it when the Spirit of God moved upon the face of the waters, were such as slowly to gather it about numerous centres, and thus to break it up into smaller fragments, from one of which our solar system was evolved. It was divided. Broad open spaces now existed where heretofore the one broad vaporous mass had been.

That fragment which formed our solar system filled all

the space now marked by the planets in their journey round the sun. That is, it extended outward so as not only to include the remote orbit of Neptune, but far, far beyond. And as the great disk whirled more and more rapidly, in proportion as it cooled and shrank, it threw off at last from its outer rim a ring of vapor. This ring at last broke, and rolled itself into a huge vaporous ball, which at last became a solid globe. This was the first planet of the system. Then an inner ring was thrown off and another planet was born. And then there was another, and another, till at last the whole train was created and in the centre blazed the sun. It was a space-making era. God was creating an expanse. And, if Moses in vision saw this work going forward, and the world a-making, in what better terms could he describe it than to say, "And God said, Let there be an expanse in the midst of the waters, and let it divide the waters from the waters ; and it was so."

Professor Guyot* says, "The central idea of this day's work is division or separation. The vast primitive nebula of the first day breaks up into multitudes of gaseous masses ; and these are concentrated into stars. Motion is everywhere. Gravitation and chemical forces tend to concentrate matter around various centres, and then to isolate them from each other. Centrifugal force tends to disperse them. Under the law of the forces of matter and motion, established by God himself, and under his guidance, those numberless bodies of all forms and sizes, which fill the space and adorn our heavens, combine into

* See his admirable paper read before the Evangelical Alliance in New York.

those worlds and groups of worlds, whose wonderful organization it is the province of astronomy to discover. It is premature to say that this noble science has as yet furnished us a satisfactory history of the generation of the starry heavens, and of their real structure; but much has been done toward it. In the genesis of our system, as explained by the genius of Laplace, and submitted by Alexander to exhaustive calculation, the result of which amounts to a demonstration of its truth, we see one of the processes by which has taken place the separation of individual planets from a vast central body, holding them in bondage in their orbits by the power of its mass. In the twin stars revolving round a common centre of gravity, we perceive the effect produced when the masses are more nearly equal. In the nebulous stars of all grades, we follow the gradual concentration from a gaseous state to a compact and well-defined body. In the great spiral nebulæ discovered by Lord Rosse, we behold the actual breaking up of a world of stars of all sizes and brilliancy, and witness the very process of their dispersion through space by centrifugal force, along paths they are never to retrace."

Such is the nebular hypothesis, as expounded by this distinguished Christian scholar; and he concludes a subsequent paragraph by saying, "One fact recognized by all is the work of separation, of individualization, which must have preceded the present combination of the heavenly bodies, and is indicated as the special work of the second cosmogonic day."

Whether we can be perfectly certain that it was just this space-making to which Moses referred, when he said, "God made the rakhiah," or not, this we can at once per-

ceive: that if he had this epoch in view, he describes it in quite fitting terms, and sets it in the right place. The primitive nebula first receives motion, and then becomes luminous. As the next step in the process it breaks up into separate masses with broad spaces between. If Moses beheld these things in his vision, this part of the process would particularly attract his attention. Those great luminous patches in his outlook rapidly assume regular form. The huge disks spin round, each on its bright centre. Rings of bright vapor fly off and rapidly form into worlds. The suns blaze. The planets sweep round in their orbits and their satellites move on in their lesser spheres. Where the fire-mist was just now diffused, stars begin to twinkle. Where the light was but faint, great fires now kindle, in the light and heat of which the planets bask as they pursue their way. Golden beads are strung along the open spaces; and looking out between, vastness opens too deep to be penetrated by even the assisted gaze of this man of God.

If this was the second day, what a sublime day it was. Not the creation of light itself, commonly referred to as the grandest part of this great work, could compare with it; for it was the light concentrating, intensifying, and ranging itself in forms the most curious, and in an order so beautiful that the wonder is renewed every time we turn our eyes toward the richly garnished heavens.

CHAPTER XIX.

ANOTHER VIEW: THE ATMOSPHERE.

THE objection that scientific men have raised against the story of creation as given by Moses is, that there is nothing in the actual history of creation to correspond with it. But, as we go on with these studies, we shall find it our difficulty, not so much to discover something in nature that matches the story, but to determine among several things which one at certain points will match it, and which to seize upon as the real parallel. At several places the narrative is so constructed as to adjust itself to either one of several periods in the creative work.

Such is the case peculiarly with this account of the second cosmogonic day. What Moses records on that subject describes almost equally well either one of two great chapters in the history of creation. We have seen how it describes the space-making era. Let us now mark it as descriptive of the creation of our atmosphere.

To reach this date we must make a rapid flight, down from the time of those separations in the great nebula, just described, and take our stand upon our planet, after it has become a solid globe. It is the time when the world is covered with water, and when it is wrapped in dense clouds. The great storm-period has passed ; but

the vapors still hang low and dark along the surface of the universal ocean. The sun is blazing; but its light can not penetrate those heavy layers of vapor which lie piled one above another, from the surface of the earth to the present aerial regions. Darkness is upon the face of the deep; and the vaporous masses and the waters of the ocean mix and mingle together.

Slowly and faintly these vapors grow less dense, and the light struggles in. It is but a dim, uncertain light, however, and only sufficient to show how waste and desolate a thing is this great world. The clouds and fog-banks must be uplifted. The dark heavy masses must be cleared away. And we must have an open atmosphere. How perfectly adjusted to this process is the story of the second day! And God said, Let there be an expanse in the midst of the waters, and let it divide the waters from the waters. And God made the expanse, and divided the waters which were under the expanse from the waters which were above the expanse; and it was so. The creation of the firmament, thus understood, would be the creation of the atmosphere of our globe; and the word "creation" would have to be understood in the sense of "dividing" those elements which compose it from those other elements which were confusedly commingled with it, and combining them in such proportions as would constitute a transparent aerial envelope for our planet.

The atmosphere, as we now have it, is made up of two gases. The principal one of these, oxygen, is a life-power; but being of too intense a nature, it is diluted with nitrogen, as one would dilute a cup of tea, which was too strong, with water. To this a third element, carbonic

acid gas, is added ; but at present it exists only in small quantities. It is a poisonous ingredient, to all air-breathing animals, though quite important to the growth of plants ; and were it in the atmosphere in any great quantity, it would be fatal to human life.

In the earlier stages of creative history, as will be more fully shown hereafter, carbonic acid gas existed in immensely greater quantities than now ; so that when our atmosphere was first cleansed of the mists and clouds that darkened it, no air-breathing creature could have inhaled it without instant death. And it curiously corresponds with this circumstance, as noted by Professor Waring, that when this second day's work was completed the usual formula, "And God saw that it was good," is omitted. Such an atmosphere was not yet good.

In process of time, however, this noxious element was taken up ; and the *rakiah* was perfectly adjusted to the wants of man. By a curious process, hereafter to be noticed, this carbonic acid gas was consolidated into the most beneficial substances, and so was got out from the atmosphere, except the harmless amount that still remains to nourish vegetation. And now the great aerial ocean stands pure and perfect from the lowest valleys up to the tops of the mountains. The ocean of water covers about three-quarters of our globe ; but this atmospheric ocean bathes both sea and land. The ocean of water has an average depth of about three miles ; but the atmospheric ocean has a depth of at least forty-five miles. The ocean of water, however, greatly outweighs that of the atmosphere ; and a column of the former, thirty-three feet high, will balance a column of the latter of the entire

altitude of forty-five miles. Moreover, the ocean of water is more habitable than the other, its finny people dwelling in it to the very top, and in their rapid movements sometimes leaping out of it; while our atmospheric ocean is habitable only in its lowest parts, and should we by any means be lifted half way to the top we should but give a gasp or two and perish. The point where life is most intense in these two oceans is, however, where the one joins the other. In the deep sea soundings there is little more of life than in the upper strata of our atmosphere. In the upper waters of the sea, and in the lower regions of the air, there alone do we find animal or vegetable life in its best condition. It is a very narrow limit to which it is confined—just where earth and air come together.

The reason we can not live at greater elevations in our atmosphere is because of its extreme elasticity and tenuity. The attraction of the earth pulls it down upon us; and the upper air pressing on the lower condenses it at the bottom sufficiently for purposes of respiration. As we go upward, however, it becomes lighter and thinner. At the height of three miles, both man and beast find breathing difficult, and exertion painful. At the height of seven or eight miles, life can not be sustained for any great length of time. The most conclusive experiment perhaps that was ever made, in seeking to reach great aerial elevations, was that of Messrs. Glaisher and Coxwell, who made a balloon ascension from Wolverhampton on the 5th day of September, 1852, and who reached the utmost limits at which life could be sustained. At an elevation of 19,000 feet Mr. Coxwell was panting for breath. At the height of 29,000 feet Mr. Glaisher's eyesight began to fail; and

shortly after he found his hands and arms powerless. "Then," he says, "I tried to shake myself, but seemed to have no limbs. In looking at the barometer my head fell over my left shoulder. I struggled and shook my body again but could not move my arms. Getting my head upright for an instant it fell over on my right shoulder. Then I fell backward, my arm resting against the side of the car and my head on its edge. I endeavored to speak, but I could not. In an instant intense darkness came over me. I thought I had been seized with asphyxia, and believed I should experience nothing more, as death would come unless we speedily descended. Other thoughts were entering my mind when I suddenly became unconscious as one going to sleep." Mr. Glaisher supposes that they reached a height of about 36,000 or 37,000 feet. It is quite certain that they did not reach a height of above seven miles; and quite possibly it was less than six. But it was only by Mr. Coxwell seizing the valve cord in his teeth, and pulling it after his hands had become useless, and thus effecting a rapid descent, that either one of these daring voyagers escaped death.*

An important thing was it for our world when God gave it an atmosphere; but in that—as in everything else he makes us keep our place. We are lowly creatures yet. We can not soar very far. But by and by, if God please, we shall gain other faculties, and travel through far other regions in space: *Per aspera ad astra*, — through the rough places up to the stars.

* "Aerial World," page 12.

CHAPTER XX.

THE USES OF THE ATMOSPHERE.

EVERYTHING for a purpose: such is the law of God's working; and the purpose for which he prepared the expanse is indicated in the words, "And let it divide the waters from the waters." Nothing is said here of the immediate relation of this expanse to human life; for as yet such life has not appeared. Things are gradually preparing for it, however, and the forming of the expanse is one step in the general preparation. The waters must be divided from the waters. And this, taking the view indicated in Chapter XIX., makes the second day an epoch marked by the passing away of the great storms which have prevailed, and by the ushering in of pleasant weather.

On a small scale we have the same process repeated in those atmospheric changes which still prevail. A thunder-cloud darkens the earth and pours down a deluge; and in an hour the skies are bright again. Thick fog-banks obscure the landscape and lie low along the seas; but directly the wind springs up from a clearing quarter, and at once the whole scene is changed. If Moses saw such changes as this occurring on that broad scale that measures everything he here describes, we need not wonder

that the glad vision arrested his attention, and found place in the record he was preparing.

How desolate a scene this world must have presented before these changes occurred! We may form some idea of it by the cloud and darkness that, even yet, sometimes gather in our sky. Egypt was once wrapped in such a darkness for three days; and in places like London and Glasgow scarcely a year goes by but there is at least one day when a dense mist settles down upon the scene, turning day into night. A London fog is a phenomenon of world-wide celebrity; and sometimes it becomes a very serious matter. From the 8th to the 14th of December, 1873, according to an account published in the "Aerial World," that city was wrapped in a mist so dark that it entirely stopped the traffic on the river, and compelled the suspension of business at the docks. On the 12th, about noon, the veil was lifted a little, so that objects could be indistinctly perceived at the distance of a few paces, but it soon grew dark again. The gas-lights could not be seen along the streets, and the few cabs and omnibuses that ventured out had to be escorted by torchbearers, and could only move step by step. It was a darkness that might be felt. It became dangerous to move about, and several lives were lost. Much the same experience is sometimes had in Glasgow, where the street lights have been known to be kept burning day and night for a week at a time. On the Banks of Newfoundland the fogs constitute one of the greatest perils of the navigator; and among the Alps the mists that sometimes sweep down upon the bewildered traveler are full of danger. This may illustrate the condition of our planet

when the call was made for the second day. This was a world wrapped in a London fog ; and this call was to lift the mists into the upper air, and to open an expanse between those luminous, feathery masses still floating in the sky and the tossing ocean that crested its green waves with white foam below.

This was one use of the expanse. It constituted an open space in which, when man appeared, he could live and move and have being. It divided the waters that were under the firmament from the waters that were above the firmament ; and it was so.

But this was not all. Many uses for one thing, is God's order ; and when once our race arrived upon the scene, various benefits, derivable from this source, were apparent, which would not be so likely to suggest themselves to one who simply witnessed the process of creation. Man was to have a sense of hearing ; and through this sense he was to gain whatever is valuable in the gift of speech and whatever is beautiful in the combinations of musical sound. But had there been no atmosphere there could have been no sound. A clock may be made to strike under a glass receiver from which the air has been exhausted ; and though you can see the motion, you can hear nothing. In our moon, which has no atmosphere, even the outbursting of a volcano would occur in utter silence. Had it been possible to live in a world thus arranged, we should have been a race of deaf-mutes, neither hearing nor capable of producing sound.

But neither is this all. The atmosphere is of use to keep these bodies in proper shape and proportion. From within every human body there are forces stronger than

we know, pushing outward. The fluids and gases that go so largely toward making up the system have a powerful distending quality; and it is only because the atmosphere presses in upon us in all directions from without, that the human frame is not distorted and life destroyed. It takes about fourteen pounds of this hard pushing against every square inch of surface to keep us in present shape. We are not conscious of the pressure, because it is so nicely balanced; but the fact is easily demonstrated.

It would also be proper here to mention those uses of the atmosphere in which it ministers to the sense of smell. This sense is commonly reckoned low among the faculties, but it has some very important offices to serve; nor is its ministry wanting in what is delicate and refined. The keen scent of the greyhound is a most extraordinary endowment; and by the same faculty many of the lower animals are able to elude their enemies or pursue their prey. God most beautifully ministers to this faculty in man, though we possess it in but a moderate degree, by floating to us on the atmosphere the various fragrance of ripe fruit and open flower. On the 8th day of April, 1872, the writer landed at the port of Joppa in Syria. While the ship was at anchor two miles off the coast, we were greeted with a very sweet perfume. The morning was bright, and the wind was lightly drifting toward us from the shore, and the fragrance of the orange orchards, at that season not only in bloom but full of ripe fruit, was borne to us as our first welcome to the land on which our Saviour once trod. Captain Thompson, of the steamer *Trinacria*, told us that he had detected a similar fragrance in passing a fruit-ship on the Mediterranean, at a distance

of twelve miles. The perfume was taken up and borne all that distance through the air.

Chief among the uses of the atmosphere, however, stands the use of respiration. God intended to stock this world with breathing animals, and for such animals air is a necessity. Man stands chief among these creatures, and without an atmosphere would immediately gasp and die. The office of respiration is two-fold—to purify the blood and to build up the system. The blood, as it comes in toward the heart from the extremities, comes very impure. Its color is purple, in some parts of the system almost black; and there is mingled with it a great excess of carbonic acid. A pump-stroke at the heart, however, sends it to the lungs, where it is spread over an immense surface. Then the lungs heave and in comes a chest full of air. It touches the blood, penetrating the thin membrane which holds it. The blood drinks in the oxygen which the air contains, and throws out, in exchange for it, the excess of carbonic acid. Another pump-stroke, and the blood from the lungs, now no longer black, but of a bright red color, is sent out through the arteries. It reaches the extremities. It deposits the oxygen there, taking up once more a load of carbonic acid and carrying it to the heart. Then it goes to the lungs again, then is aerated once more, and then again is sent out to build up the tissues. This is respiration. With each breath of air we take in this oxygen. We get it not in a pure state, but diluted with nitrogen, so that it may not do its work too fiercely. And, as the life element comes in, the heart throbs and sends the poor, dark, venous blood up to the lungs to meet it. The carbonic acid goes out. The oxy-

gen comes in. The blood grows suddenly bright, as if receiving a new life-principle, and then another heart-throb sends it coursing to its destination all over the system. Moment by moment, these two engines, heart and lungs, keep up their piston-strokes and valve-movements. They work on when we are least thinking of it. They do not stop even when we sleep. The lungs heave, the heart pumps, the oxygen comes in and the carbonic acid goes out, and so we live.

It was once supposed that something of the nature of combustion occurred at the lungs, and that this was the source of animal heat. This was the theory of Lavoisier, who first discovered these changes; and, with some modifications, the same view was taken up by Liebig. Later and more accurate researches, however, as stated by Professor Dalton, have exploded that theory, and animal heat is assigned rather to certain chemical changes going forward in all parts of the system. Nevertheless, it stands closely connected with respiration, as is seen in the fact that it is greatest in air-breathing animals; and greatest among these in proportion as the creatures' lungs are of great size and of perfect formation.

Certainly respiration is of the utmost importance. We talk of bread as the staff of life, but it bears no comparison in that respect with oxygen. A man can live without food for days together; but he cannot live without air for an hour. "The breath of life," the Bible calls it; and the reservoir from which it is drawn is this great crystal ocean that everywhere floods our globe.

CHAPTER XXI.

THE ATMOSPHERE AS A WATER-CARRIER.

WE have a sign in the zodiac, and a constellation in the starry heavens, known as Aquarius, or the water-carrier. And we might with some propriety apply the same name to our atmosphere. For, that work of "dividing" the waters which it began on the second cosmogonic day involves the transportation of water in immense quantities, and to great distances across our planet. That work is still kept up and prosecuted with an energy and a continuity worthy of all admiration. We have looked upon this atmosphere as the material for respiration: let us look upon it in this chapter as the great agent in irrigating the continents, and so fitting them for the production of vegetation.

To water the earth is a work which, considered from a mere human view, might be said to involve some difficulty. The oceans indeed furnish an abundant supply of the material; but it is so impregnated with salt as to be unfit for use, and the continents are widespread and uplifted. The problem is to take up a sufficient quantity of that water, to free it from the salt, and to transport it often for thousands of miles so as to send it down where it is needed. How can this be done?

The work of supplying a city with water, though it be only from a distance of perhaps twenty-five miles, sometimes quite taxes our engineering skill, and involves an expenditure suggesting taxes of another sort. The Romans built aqueducts for such purposes, carrying water by slow descent across vast stretches of country, and keeping up the level over all the deep valleys, because they did not know that water could be conveyed by means of pipes down into a valley and up out of it again. King Solomon, in his wisdom, used a curious cement pipe for this purpose, taking the water from his pools, six miles away, to the Temple; but even he was so ignorant of hydrostatics as to wind his levels around the hills, instead of making a short cut down through the valleys and up out of them. Even at the present day, the question of water-supply often becomes a serious one.

In the case now before us, however, we have the proposition not merely to supply a great city but all the continents; and we must distil the water so as to get rid of the salt; and we must raise it so as to reach all the uplands; and we must furnish it in quantities sufficient not only for drinking purposes, but for irrigation. We must fill the springs with it, as they gush from the hills. We must pour it along the mighty river channels, and float the ships upon it. We must spread it out in broad lakes that are themselves like seas. How can it be done?

This was one of the problems to be solved in the process of world-making. And it was solved in the following manner. In the first place, the water was so constituted as to have a constant tendency to evaporation. That is, wherever it was exposed to the air, it should be evermore

changing to vapor ; and in the next place this vapor was to be taken up by the air and carried from place to place. A wet handkerchief hung in the open air soon becomes dry. That is, the water that is in it changes to an invisible vapor and is carried away. What is done in the case of the handkerchief occurs wherever there is a spot of moist earth, or wherever there is water in any way exposed to the air. All along the streams, all across the lakes, and above all upon the broad surface of the great seas, the water is in perpetual process of rapid evaporation. The product is invisible, but it is none the less real ; and the atmosphere takes it up, as a great sponge soaks up fluids, until it can hold no more.

Then comes in another arrangement. The air is in constant motion. Here a current sets toward the west ; next a current sets toward the east. The wind is north to-day, and to-morrow it is south ; and so these treasures of moisture are carried all over the world. When this vapor is carried into a cold place, the air is condensed, and parts with a portion of its moisture which falls in rain. The great sponge is squeezed and the water is pressed out of it. What is pressed out falls upon the fields and fills the springs. This is nature's arrangement for water-supply ; and it works as by a kind of perpetual motion, from age to age.

The amount of work thus done is enormous. We speak of the tremendous forces that must have been at work in the upheaval of those great mountain chains which mark our globe ; but that work is every year outdone, by the uplifting of these masses of water and conveying them across the earth. Tons of moisture are taken up from

every acre of wet meadow and low swamp-land every twenty-four hours. The process is indeed more rapid during the warm season of the year; but as your wet handkerchief hung out in winter will "freeze dry," so the process of evaporation still goes forward even when the earth is robed in snow and ice. And so it happens, that along all the atmospheric currents the moisture is being borne to the places where it is needed.

Rev. Wm. Arnot, of Edinburgh, in his little volume called "The Present World," seizes this thought and makes a prose poem of it. "Look up into these clouds," he says, "these great water-carriers for the world. How joyously and jauntily they career along! The huge masses skip and whirl and chase each other like lambs at play, neither wearied with the weight they bear nor dizzied by the long look-down. Here for once is perfect engineering applied to water-supply. No retaining walls are needed, and no windings to maintain a level. How softly they lie; how quickly they move; how gently they fall where they are needed, and when! You are awakened out of your first sleep by a rattling in the casement and a rumbling in the chimney. You rise and look out on the moonlit sky: the cause of the nocturnal commotion is discoverable at a glance. An interminable line of laden clouds, like a luggage-train, every wagon heaped far above its brim, is spinning eastward through the sky, from the Atlantic to the dry table-lands on the confines of Europe and Asia. Those thirsty regions have telegraphed by electricity through the air, most probably, to their correspondent in the western waters, that the Caspian and Dead Seas are in danger of becoming dry. The correspondent, ever

watchful, and having withal a large stock in hand, newly distilled from the Atlantic, immediately dispatches an extraordinary night-train, with orders to run express all the way; 'for the King's business requireth haste!' There it goes, frightfully quick, and with an infinity of imposing sound. But you may perceive it is running on the main line; the axles are well greased, and the switches are all right; you tumble into bed again by way of shunting into a siding, and sleep soundly till morning, confident that no collision will take place."

The same delightful author tells us how he once caught nature in the very act of cloud-making, the circumstances being such that the usually invisible vapor could be plainly seen. He says: "Detained two days in Brieg, in the valley of the upper Rhone, I had no other employment than to climb the mountains on the one side, and thence to gaze upon the mountains on the other. A huge basin on the summit was full of ice and snow, and the sun of September beamed down mightily upon the accumulated mass. From the heated cauldron a small column of pure white mist rose to a considerable height, and then spread out like a flower on its stalk, until a puff of wind came, and carried the bundle of the manufactured article away through the atmosphere, to a large bank of cloud that was 'lying to' in the neighborhood, like a ship at sea. The process was repeated at intervals of ten minutes, and as each portion of newly-made cloud was turned out of the factory, it was sent on the wings of the wind directly to the store."

This process is continually going on, though few of us ever have so good an opportunity as did Mr. Arnot to

witness it, and fewer still could describe it in language so beautiful were the sight to be afforded us. All over the moist lands, all along the streams and across the lakes and ponds, and all abroad over the deep and wide sea, the waters are being "divided," and a portion is being borne away to "water the earth." The rain that fell last night was distilled for us in that steaming cauldron which gives us so large a portion of our water-supply—the Gulf of Mexico. The next that falls will be sent us perhaps from the north-eastern Atlantic; and the next in a thunder-gust brewed upon the great lakes of the north-west. The clouds sail across the sky in all these directions, like ships across the ocean, each laden with its pure and pearly treasures, and each having definite arrangements as to how much freight to discharge, and when to raise the hatches, and where to unlade.

Nor is this all. The moisture of the atmosphere serves important purposes even when it is not discharged in rain. We need moist air for respiration; physicians tell us much of the ill effects of our close furnace-heated rooms, where the opening joints in our furniture, and the loosened fastenings of our doors, seem like nature's own gaspings for better air and her struggles to let in the ever abundant supply; and the growing paleness of the faces at our tables enforces the lesson, and indicates to us the need of a water-carrier that shall have free access to all our apartments. It is not too much to say that carefully as the air is constituted, with respect to oxygen and nitrogen, no one could long live in it, except for the watery particles which it also enfolds.

And this contributes to the beauty of our world, as well

as to our necessities. It is the aqueous vapor that gives the sky its blue. It is this, forming minute vesicles, or bubbles, which massed together, and electrified, gives us our white fleecy clouds, for which the blue sky furnishes so deep a background. We have from the same source the softening tints of the landscape, especially in the distance—the purple of the mountains, and the dim haze of blue that hangs like a thin gauze veil over the meadows and the hills. And it is by the same means that we get all the gorgeous coloring of our American sunsets, never twice the same, often superb in gold and crimson and fire, and quite unsurpassed by the famed “Italian skies.” “O Lord, how manifold are thy works! In wisdom hast thou made them all!”

CHAPTER XXII.

THE NAME HE GAVE IT.

AND God called the firmament Heaven. He named, in this way, successively, the several things that he created. He called the light Day. He called the darkness Night. And the gathering together of the waters called he Seas. So, when he opened this expanse, and enveloped our world with an atmosphere, he called that Heaven. The term is derived from a Hebrew verb which signifies to be uplifted, and has reference to its height. Our English word *heaven* has much the same origin and meaning, being derived from the verb to heave, meaning to lift upward, and signifying an uplifted thing. A literal rendering of the term, therefore, would be The Altitude.

There are three ranges of such altitude in the universe, each separately called heaven; and the true *rakiah*, or expanse, may be conceived of as embracing them all. The first and lowest of these consists of our atmosphere. It seems, indeed, high enough, when we look up at the blue arch into which it figures itself; it certainly stands much higher than anything on earth; but compared with the two other heavens, it is all close at hand. The atmosphere is commonly reckoned about 45 miles in height; but observations have made it quite certain that it is at

least a hundred miles high, and perhaps two hundred. Indeed, it is quite uncertain whether its limit is determinable, and whether it does not so gradually melt away into the luminiferous ether beyond that the line between the two cannot be drawn. This is the first heaven: the place in which the clouds sail and the birds fly.*

Next comes the starry heaven—the great expanse created in the space-making era referred to in Chapter XVIII. This is a much loftier altitude. Behold the height of the stars, how high they are!† It is the vain struggle of science even in our own day to measure, and to represent in figures that will have any meaning for us, the height of the stars. We mean, of course, by height, distance from the earth; and the distance of the fixed stars, in most cases, baffles computation, and in nearly all cases baffles all attempts at intelligible expression. We take our largest measurement, the mile, and we compute it in our largest common number, the million, and it runs us into lines of figures which we simply read without comprehending. Mr. Darwin, in his “Origin of Species,” gives us an illustration, by which to compute the magnitude of our expression, “a million.” He says, stretch a strip of paper $83\frac{1}{3}$ feet in length along the side of a great hall. Then go to one end of it and measure off one inch. Then take the inch and divide it into tenths. One of these tenths will represent 100, and it will take by that scale the whole $83\frac{1}{3}$ feet to represent a million. Our millions exhaust themselves in measuring the planetary distances: how much more in measuring the dis-

* Gen. i. 20. Ps. cxlviii. 4.

† Job xxii. 12.

tances of the fixed stars. Well indeed was it named—this expanse, including the starry spaces—the heaved-up thing, the heaven, the high. But as we shall reach this subject again in the work of the fourth day, this must at present suffice for the heaven of the stars.

Beyond this lies the third heaven,* to which God takes his people when they go out of this world. There God's throne is set, and there the cherubim and seraphim salute him with their songs. The apostle Paul speaks of that world as one with which he had once had a remarkable experience: "I knew a man in Christ . . . (whether in the body I cannot tell, or whether out of the body I cannot tell: God knoweth), such an one caught up to the third heaven." Such language implies locality; and quite in agreement with this thought are some other portions of the sacred word. From that place came our blessed Lord, and to that place he returned, taking with him that same body in which he suffered on the cross for our sins. From that place also came the angel Gabriel, "being caused to fly swiftly" that he might reach the prophet with his message "at the time of the evening oblation." † And we shall not get very far astray on this subject, probably, if we include this uppermost of the three heavens, also, in the rakiah which was opened so deep on that space-making day. A world, perhaps a system of worlds, has been created, amid which God shall manifest himself in a peculiar manner, and where he shall surround himself with beings whose natures are like his own. There the King holds his court. Thence he sends dispatches to the outlying provinces of creation. And it is unto that

* 2 Cor. xii. 2.

† Dan. ix. 21.

place, beautiful beyond comparison, and blessed beyond thought, that he will at last bring up those lowly beings on whom his own image has been stamped, and who have been redeemed by the blood of his only-begotten Son.

It might well be that "star-eyed science" should stand in reverent silence, when asked the way to that world. She has no voice to answer that question; but silent though she is, she has more than once been seen pointing with significant finger out into those depths where the Happy Place may yet be found to lie. Professor O. M. Mitchell, in his "Planetary and Stellar Worlds," sketches the calculations of Argelander and Struve, leading to the conclusion that there is a point round which the whole starry system turns. And the same distinguished author says that Maedler, the successor of Struve in the observatory of Dupal, has indicated the direction in which we must look for that critical point, if we should desire to find it. First, he determines that it must be somewhere in the direction of the constellation Taurus. Next he narrows down the range to that group in this constellation, known as the Pleiades, or the Seven Stars. And thus pressing on from star to star, and from point to point, subjecting each step in his calculations to the severest tests, this great astronomer reaches his conclusion: "Alcyone, the principal star in the group of the Pleiades, now occupies the centre of gravity [for the whole heavens] and is at present the sun about which the universe of stars composing our astral system is revolving." In another observation, he discovers that this Alcyone "occupies the optical centre" of the immediate group to which it belongs, and says that "the telescope shows no

less than fourteen great suns in all, balanced one with another, in that great central system." No wonder that with such discoveries as this in mind, that eminent Christian scholar, Dr. Dawson, of Montreal, should suggest that if our world should continue long enough to accumulate the necessary observations, "we might hope even to calculate the direction and distance of this physical heaven of heavens." *

Speculations like this may not be very conclusive; but, if even speculation shall bring us more to think of the blessed world, and shall give it something more of reality in our minds, it may serve a useful purpose. Suppose that Maedler's reckoning should prove true; and suppose that his great centre, with its fourteen blazing suns combined in one system, shall represent a colony of worlds, which, like green islands in the deep sea, shall constitute the home of the blest. "In my Father's house are many mansions;" and, with so many suns shining at once on his habitation, we may well say, "Who coverest thyself with light as with a garment;" while we take up with a new and more definite meaning the oft-repeated words of the Revelator, "There shall be no night there."

There is one picture of that world in the book of Revelation, which, in this connection, has deep interest for us. "I saw as it were a sea of glass mingled with fire, and them that had gotten the victory stand on the sea of glass, having the harps of God." *As it were*—that is, this is the comparison. It was a sea that looked like glass—a crystal sea. It seemed mingled with fire, too, just as the smooth sea sometimes looks when you gaze

* "Nature and the Bible," page 71.

across it toward the rising sun. The time is morning. The night has been one of darkness and of storms. But the day is breaking ; the sun is rising in clear sky ; and his level rays now gild the silent waters. Their tossings are over. And these happy souls that stand upon the sea are "on" it only as a city is said to be upon the sea, which is built along the shore. They have landed on the white beach, not shipwrecked, but rescued ; and there they view the wondrous calm. The danger is all over now, the wear and worry of life past, the dark struggle of death past, and they take up their harps and prepare for the new song. We wait a little and it begins ; and, as they sing, the music rises to a loud and lofty strain. Louder than the voice of the waves that just now brake upon that shore, louder than the howling of the winds that tossed and almost wrecked them, even as "the voice of a great thunder, and as the sound of many waters," it rolls across the deep, and we catch the distant strain even from our far-off shore. "Salvation unto our God, and unto the Lamb, forever and ever. Amen." About the locality of heaven we need not have much dispute. Of its altitude, whether we refer to its place in the material universe, to the magnificence of its fitting up, to the blessedness of its enjoyments, or to the purity of its pleasures, we need, however, have no doubt. It is the uplifted place, the heaved-up, the Heaven.

CHAPTER XXIII.

OPENING OF THE THIRD DAY: A WORLD UNDER WATER.

IT is time we noticed the curious order in which the story of creation is constructed. We have already observed how the successive movements of that sublime work are grouped into six periods, or days; but these days themselves are also grouped; and the cosmogonic week is subdivided into two great chapters. The first of these chapters embraces the first three days; the second chapter embraces the next three; and the whole is preceded by an introduction and followed by a conclusion, while the two chapters also curiously correspond the one to the other. The first day of the first chapter gives us light: the first day of the second chapter gives us the great sources of light, the sun, moon, and stars. The second day of the first chapter gives us the firmament, dividing the waters from the waters: the second day of the second chapter gives us the fowl that fly in the open firmament and the fish that tenant the waters. The third day of each of the two chapters presents a double work—that of the first giving us (1) the dry land, and (2) the highest form of unconscious life, while that of the second chapter gives us (1) the animals that inhabit the dry land, and (2) the

highest form of conscious life, viz. the human. The following tabular statement, which as to substance is to be credited to Professor Guyot, will perhaps make all this plainer :

OUTLINE OF CREATION.

INTRODUCTION.

1. Origin of matter : in the beginning God created the heaven and the earth.
2. Matter nebulous : and the earth was without form, and void.
3. Motion and potencies : and the Spirit of God moved on the face of the waters.

THE SIX DAYS.

<i>The First Three Days.</i>	<i>The Second Three Days.</i>
1. Light. Gen. i. 3.	4. The Lights. Gen. i. 14.
2. Firmament, dividing the waters. Gen. i. 6.	5. Birds that fly in the firmament, and fish that swim in the waters. Gen. i. 20-23.
3. A double work : (1) Dry land ; (2) Highest unconscious life. Gen. i. 9-12:	6. A double work : (1) Land animals ; (2) Highest form of conscious life. Gen. i. 24-26.

CONCLUSION.

7. Creation ended. God rested the seventh day. Gen. ii. 1-3.

The third day opens with the call, "Let the waters under the heaven be gathered together unto one place, and let the dry land appear." We are to infer that when this call was made the waters were in all places, and that the dry land had not yet appeared. This means that our world was under water. There was a universal deluge—not the flood of Noah's time, but a much earlier one, and one of probably much longer duration. Has science any response to make to this statement ?

Nothing is more common than to find the petrified shells of marine molluscs very far from the sea. You break off a piece of rock in Western New York, and you find one of these shells in it. You pick up a fragment of similar rock in Kansas, and you find another. You know that these are not fresh-water shells, because in a fresh-water bivalve like this the beak or most prominent part of the shell is nearer one end than the other, whereas in this fossil shell it is in the middle. Moreover, in the fresh-water shell the two lids of the bivalve are alike, whereas in the one you found in the rock the two lids have a different degree of convexity. And if you were to familiarize yourself with the forms of sea molluscs, you would find creatures still living in the ocean, sufficiently like what you discovered in the rock, to indicate that they belong to the same general family. You have picked up a petrified sea-shell; and, if you go on looking for such curiosities, you will perhaps find something that people call "petrified honey-comb," which is in fact a species of coral. And still other varieties of sea-life will greet you, until you are forced to the conclusion that the country over which you are walking was once entirely submerged. Things like this appear everywhere. There is not a continent or an island on the globe that does not give evidence of having had its foundations laid under water.

Well, if we have correctly traced the history of creation thus far, this was exactly the condition of our planet before life dawned here. The crust of the earth was as yet but little wrinkled, because the process of condensation had as yet proceeded but a little way. Or, what means the same thing, the mountains had not yet been much

uplifted, nor had the ocean beds been greatly depressed. Moreover, the vaporous masses that had so long hung around our globe had been condensed, and there had been a long period of storm. The rains had flooded the earth everywhere. There was no dry land. One unbroken sea prevailed from pole to pole ; or if it was broken here and there by an incipient granite mountain summit, the exception was scarcely to be taken into account in any general statement of the case. Geologists, with scarcely any dissent, assign such an era to our globe. They tell us of a time very remote when it was a world under water. In short, they tell the story very much as Moses told it before geology was born.

It was once the fashion to refer all these wide-spread water-marks on our planet to Noah's flood. And it was supposed most wonderfully to confirm the account of that deluge that we were able so distinctly to show that the sea had once overflowed all the land. But curiously enough, no one seemed to notice that Moses had given an account of a universal deluge with a much earlier date ; and so when it began to be shown that Noah's flood, which, as described in Genesis, lasted only about six months, never could have produced all the water-marks we see, it was almost felt that one of our props was being knocked away. But as we have studied our Bible more thoroughly, we have found it saying that there was a flood before man appeared on 'the earth ; before the birds or the fish were created ; before the earth brought forth grass ; before the mountain-chains rose to their present height ; before the continents were lifted to their present level. So says the Bible. Before geology was wrought

out we could not have confirmed this statement from nature. Before the nebular hypothesis was suggested we could not have given a natural history of the fact. But now, as in so many other cases, so here again, science responds to the voice of the divine Word.

CHAPTER XXIV.

LET THE DRY LAND APPEAR.

IT had not yet appeared. The continents were beginning to form, but as yet they were under water. The wrinkling of the earth's crust was progressing, however, and soon the ridges began to lift themselves out of the sea. It was a slow process. It was not accomplished in a period of twenty-four hours. Indeed, it is not fully ended yet; for there are places on the earth where the sea is still retiring, and the dry land appearing where once the ocean rolled.

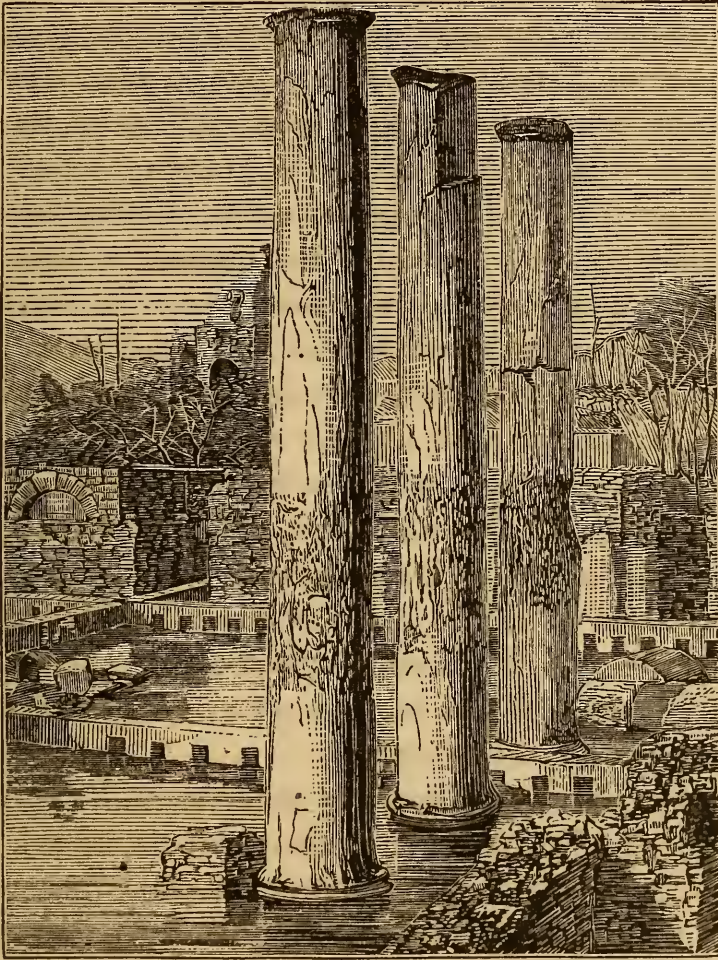
It is not stated by what means this uplifting occurred. We only read that God ordered it, or willed it, which means the same thing. Whether this order was executed by some subordinate agency, or whether he executed it directly by his own power, we do not learn from the Book. We read that he said, "Let the dry land appear: and it was so." This is all. If we can find any natural agency at work, sufficient to produce these results, we are at perfect liberty to suppose that such agency executed the order, and fulfilled the demand. If we can find no such agency, we are just as much at liberty to refer everything to miraculous power.

This work, expressed in simple secular speech, was a

change in the level of the earth's surface; and such changes are going on continually, though at present on a much smaller scale than during the early stages of our world's history. At St. Augustine, in Florida, the stumps of cedar trees can be found standing where they grew, that are covered with the sea-water even at low tide. The same is true of the coast of Rhode Island. Says Professor Winchell, in his "Sketches of Creation," "In the harbor of Nantucket, the upright stumps of trees are found eight feet below the lowest tide, with their roots still buried in their native soil. Similar ruins of ancient submarine forests occur on Martha's Vineyard, and on the north side of Cape Cod, and again at Portland. In the region of the St. Croix River, separating Maine from New Brunswick, the coast has been raised, carrying deposits of recent shells and sea-weeds in one instance to the height of twenty-eight feet above the present surface of the sea. The island of Grand Menan, off the mouth of the St. Croix River, is slowly rotating on an axis, so that while the south side is gradually dipping beneath the waves, the north is lifted into high bluffs. Near the river St. John's is an area of twenty square miles, containing marine shells and plants, recently elevated from the sea."

A famous water-mark of this sort is the temple of Jupiter Serapis at Puzzuoli, in Italy. That temple was of course built on dry land; but its marble floor is now three feet below the surface of the water. Indeed, there is a still lower floor. You find it at a depth six feet greater; and it is laid in mosaics, indicating great expense and care on the part of the builders. Rising from these floors are three marble pillars, each about forty feet high; and if

you examine those pillars to the height of about twelve feet, you find them uninjured. But above this, for about nine feet, the marble is perforated with little holes, as if it were worm-eaten. Professor Winchell says, "Exploring



TEMPLE OF JUPITER SERAPIS.

these holes, we find them to enlarge inward; and at the bottom of each repose the remains of a little boring bivalve shell—*Lithodomus*. This little bivalve is the

same species now inhabiting the adjacent waters. We know well its habits. It does not live in open waters. It burrows in the sand, or bores its way into the shells of other molluscs, or into solid stone. But it never climbs trees, nor builds its nest like a bird in the air. How, then, does it occur twenty-three feet above the surface of the water? There evidently has been a time when the whole column, to the height of these *Lithodomi*, was submerged. The oscillations of the surface, therefore, as shown by these indications, were first a subsidence and submergence of the original foundation, requiring the construction of a second arc six feet above the other; the continuation of the subsidence until the original pavement was twenty-seven feet beneath the surface, at which depth it remained a sufficient time for the little stone-borers to penetrate to the heart of the pillar—a work which they required a life-time to accomplish. Next occurred an elevation, raising the *Lithodomi* out of the water, and thus ending their existence. Nor is this all. Observations made since the beginning of the present century show that the foundations of this temple are again sinking at the rate of an inch per year.”

Oscillations of this character are discoverable in nearly every quarter of the globe, showing that the earth's crust is still far from being so stable as we generally suppose. In the earlier stages of our planet there must have been times when such upheavals and depressions were far more rapid, when they were attended with far greater violence, and when they occurred on a much broader scale. It was before man appeared, for as yet the earth-crust was too unstable to afford him a safe footing. It was before even

the lower animals appeared, before the dawn of vegetable life. Things were preparing. More and more did the dry land gain upon the water. More and more did the ocean bed sink away, and the seas retire. There was of course more or less of this sort of movement from the first forming of the earth's crust; but now it was wrought upon a scale so broad as to form a characteristic feature of the times. There was particularly at this epoch a gain in the land-surface—that part of the earth which was to be the chief theatre of human activity. The continents were growing. Mere rock-germs at first, they extended northward and southward, and began to foreshadow the shape in which they were at last to be permanently settled. The chief mountain ranges now also began to raise their heads, and those differences in continental elevation to appear which give drainage to the lands and create the courses of the rivers in their flow toward the sea. It was not a work to be done in one day of solar time. The three thousand miles breadth of North America was not drained so swiftly as that. Much less the greater breadth of the Asiatic area. Doubtless God was *able* to do this work in that brief time, but the Bible asserts no such stupendous miracle, and it is not worth while for us to invent one.

CHAPTER XXV.

THE CONTOUR OF THE CONTINENTS.

THE sea is his and he made it, and his hands formed the dry land. So says the Sacred Word; and it will not be amiss to notice in a brief way some evidence that the land-masses of our globe are the work of design. We have quite freely conceded that the shaping of the continents was performed by certain natural agencies. We have not once asked that anything of this kind should be referred to miraculous interference. But none the less does this work carry the marks of a plan and a skill that can only be pronounced divine.

Let us take a parallel case. The human eye is a piece of workmanship which can scarcely be examined for a moment without suggesting an artificer. It shows contrivance, adaptation, a knowledge of the science of optics, and marvellous mechanical ingenuity. A telescope does not at all compare with it; nor has anything yet been constructed by human hand that more clearly indicates a contriver and a workman. But then, are we obliged on this account to say that every human eye was created by miracle, and set in its place just as we find it? We can not say that if we would. The eye, like every other organ

of the human system, begins an obscure germ, and reaches its full measure under the operation of natural law.

So it is with respect to those great continental masses which rise upon the surface of our globe. The dry land has an orderly distribution, and a skillful shaping, none the less that it rose from the sea by natural law. Perhaps God was watching and superintending continually while such law, as his agent, was doing this important work : some suppose that such was the case. Perhaps he made such adjustments "in the beginning," and created such forces then as would work out these exact results : some suppose that such was his method. He has not informed us which view may be the one to accept. But this he says, and this appears in the finished result, the work was planned and executed by his own hand.

When the dry land rose it formed itself into three principal masses ; and all three are shaped, as three trees might be shaped, or as three living creatures might be formed, on one general plan. Each of these masses, as to its principal area, rests upon the northern hemisphere. Each has a southern appendage ; and the general bend and trend of both the northern and the southern masses in each case of the three is quite similar. We begin with Europe, which has Africa on the south. True, the latter is not hung to it by any actual isthmic line ; but how near the shores approach at the straits of Gibraltar, and how naturally the one groups with the other under the eye ! Asia in the same way takes Australia, with which it is almost literally united by a chain of islands. And America, North and South, seems almost to have been the completed and primitive model after which the other two con-

tinents were rudely and less perfectly formed. Europe with Africa as a southern appendage ; Asia with Australia hung upon it in the same way ; and North America with South America attached, as a kind of model to which the other two continental masses rudely conform—such is the chief grouping of the lands on our globe.

There are several other peculiarities of continental contour which are noticeable. One is, says Professor Guyot in his "Earth and Man," "That the southern points of all the continents are high and rocky, and seem to be the extremities of mountain belts, which came from far in the interior, and break off abruptly, without transition at the shore of the ocean." Thus South America runs out into the rocky precipices of Cape Horn, which ends the long line of the Andes. Thus Africa pushes out a similar point at the Cape of Good Hope, where Table Mountain rises sheer up from the waves 4,000 feet high. And thus Australia is shaped at Cape South East, of Van Dieman's Land, as if to show that each was built after one general plan.

Another of these curious analogies is found in a large island or group of islands lying just east of the southern point of each of these continental masses. South America is thus attended upon by the Falkland Group. Africa shows us in the same position the Island of Madagascar. And Australia is finished out with the double island of New Zealand. Even Hindostan, though scarcely to be reckoned with this group of southern continental termini, so nearly approaches it as to keep up the analogy, and presents us, just east of Cape Comorin, the beautiful island of Ceylon.

One other analogy between these southern appendages, as we have called them, is found in the fact that each has its back bent on the western shore, in toward the centre. The interior point of this concave in South America is reached at Arica, at the foot of the High Cordillera of the state of Bolivia. In Africa the same thing is marked in the Gulf of Guinea. And in Australia, though the bend has slid down more upon the south than the west, as seen in the Gulf of Nuyts, it still opens westward rather than eastward, and so, though imperfectly, carries out the plan.

Steffens, as quoted by Guyot, pushes these analogies still further; and having grouped the great terrestrial masses into "three double worlds," as we have done, he shows how the tendency appears, not only in the three principal southern areas to which our attention has been turned, to first expand, and then contract toward the north, while each has a narrow point piercing southward, but how all the important peninsulas of the globe approach the same configuration; Greenland, California, and Florida in America are illustrations; so are Scandinavia, Spain, Italy, and Greece, in Europe; and the two Indies, Corea, and Kamschatka, in Asia, all conform to the same law. Much more might be said on this subject; but sufficient has perhaps been shown to make it evident that the contour of the continents, so far as marginal outline is concerned, has been arranged on one general plan.

But we must not omit to notice the analogy of the elevation of these continents, as well as of their extent; for it is their elevation which is particularly noticed as the work of the third day; and for the purpose they serve in the economy of life their vertical measurement is as im-

portant as their horizontal extent. As a rule, then, each continent rises gradually from the shore toward the interior. As a rule, also, the greatest elevation of a continent is not at the centre, but far toward one side. And finally, as a rule, the long and gentle slope of each continent is toward the Atlantic Ocean or toward the Arctic Ocean, which is a continuation of the Atlantic, while the shorter and more abrupt descents dip toward the Pacific, or toward the Indian Ocean, which is a continuation of the Pacific.

This circumstance determines several things of vast importance. It determines the course and the length of the rivers. It determines the place of greatest rain-fall. It modifies the direction of the winds. It has an important influence on the temperature. And in all these ways it strongly affects the distribution of both animal and vegetable life, and thus also greatly modifies the history of man. In the hot climates our race naturally grows indolent; for nature being bountiful there, and summer incessant, there is little to compel exertion. In the excessively cold climates vegetation becomes scanty and nature niggardly, and there is no encouragement for wide plans or skillful work. So that our race is not much better in the arctic regions than in the torrid zone. But in the temperate latitudes we are stimulated to exertion, and rewarded for it, and so the race reaches its best condition there.

The great rivers, also, created by these continental slopes, have had much to do with shaping human history. Emigration, in the early stages of our race, naturally followed the principal water-courses; and both in the old

times and in the new the chief cities of the world have stood upon the banks of these streams. The Nile bears Thebes; the Euphrates, Babylon; and even the little Tiber could fix the site of Rome, while the London and New York of more modern times are planted at the point where the Thames and the Hudson debouch into the sea. The indentation of coast lines is also important; and no part of the world, at least in modern times, has attained to eminence whose shores have not opened deep for the ingress of the sea, or run out long arms to grasp the great treasures which commerce bears upon its bosom. Africa, lagging behind the whole world, the field of daring explorers and self-sacrificing missionaries even at this later day, is concentrated upon itself. It sends out into the sea no important peninsula, nor does it open its coasts freely to let in the surrounding waters. Covering the enormous surface of 8,720,000 square miles, it yet has but 14,000 miles of sea coast, the proportion being the smallest of any continent of the globe. Asia with oceans on three sides shows greater indentations, but, with 14,128,000 square miles of surface, has but 30,800 miles of coast line, being in that respect only one grade above Africa, even as it is but one grade above it in civilization. Europe, however, with but 2,680,000 square miles, has 17,200 miles of shore, and exhibits the highest form of civilization, and has given a welcome to the purest form of religion that has ever existed on our planet. Our own North America stands next to Europe in this important comparison, having one mile of coast for every 228 of area, while Asia has but one for every 459, and Africa but one for every 623.

Facts like these indicate the importance of the subject

we now have in hand. The contour of the continents was to determine at least for thousands of years the seat of civilization on our globe. Days may come, through the agency of other means of intercommunication, when our sea commerce shall be relatively less important. Then the countries with a less open outlook may advance without inviting coasts and welcome harbors. But if we are to recognize God in history thus far, certainly we must recognize his hand in the uplifting of the continents, and in their indentations and outreachings along the shores.

CHAPTER XXVI.

THE ORIGIN OF LIFE.

ONE of those doctrines which certain persons who have devoted themselves to the study of the physical sciences have broached is what is called archegenesis, or the doctrine of spontaneous generation. According to this doctrine there is a potency in our earth-matter, properly treated, to produce a very low order of life, without previous seed or germ. And numerous experiments have been made, in which it has been attempted to demonstrate the fact that mere earth-matter, from which all possible life-germs have been destroyed, may develop living things. Most scientific men regard this doctrine as quite doubtful. Indeed, the advocates of what is known as the development hypothesis, who would be expected to accept this view, if any one did, quite generally repudiate it; and the most that can be said for it is that "skilled experimenters" are diligently applying themselves to the solution of the question, and that "opinion seems to be held in a balance between conflicting evidences."

Religious people have quite generally regarded themselves as bound in duty to reject this doctrine. It seems to many such people as intended to rule out the idea of a Creator. And they are often bold to denounce it as some-

thing opposed to the clear teaching of the Bible. What, then, does the Bible say, that has any bearing on this subject? What account does it give of the origin of life on our planet? It is to this point we have come in this Story of Creation; and it will be well for us to divest ourselves of all prepossessions, and examine the record with religious care. The dawn of life here is recorded in the following terms: "Let the earth bring forth grass . . . and the earth brought forth grass." Both the command and the fulfillment are traced on through the higher stages of vegetable life, but this is the beginning: "The earth brought forth grass."

Several things in this statement are very noticeable, though this is the dawn of life, it is not represented by the word *bara*, to create, nor yet by the word *asa*, to make; but simply by the word *tadhshe*, to give birth, or bring forth. God calls for the grass indeed, he being the fountain-head of all power; but the call is for the interposition of a subordinate agent, the earth, in the production of it. That agent is put under working orders, as it were, and is assigned a task. It is to germinate grass; and it immediately proceeds to do the thing commanded.

This is not to deny at all but that God was able to create vegetation by an immediate act; and to have set not only the grass, but the "trees bearing fruit," in the soil full grown. He was able to create the world in one day, instead of six days, and just as able to create it in one instant as in one day; but we are reading his Word not to find out what he could have done if he had chosen, but what he actually did. And in the production of vegetable life, there is not the slightest hint that he created

anything full grown. Let us stand close by the record. It is quite as reverent toward God to accept his Word exactly as he caused it to be written, as it is to invent a theory, and volunteer a belief in something which he does not say.

We have passed some epochs in this history, and shall encounter others, where a direct divine interposition is expressed. We found such a place when we considered "the origin of matter;" for there, of course, it is impossible to attribute anything to second causes. We found another such place, apparently, when "the Spirit of God brooded on the face of the waters;" for matter of itself has nothing of motion, or, so far as we know, of gravitation, or of any of those qualities which are essential to the building up of the system of nature; and this "brooding" of the Spirit seems to be at the place where such qualities were imparted. But here, God expressly calls in a secondary agency. It is not an absolute creation that is here recorded, but a birth or a bringing forth. God's call impregnates the soil with vital forces, and forthwith vegetation begins to appear.

Now this is not spontaneous generation; but it is a door open for the acceptance of that doctrine, if it shall ever be established. For, if such vital forces were imparted to the earth at that early epoch, who can say but that at least a remnant of such forces is discoverable now? It need not at all alarm us, should such be found the case. When it shall be fairly proven, if it ever shall, that the doctrine of archegogenesis is true, and that simple earth-matter, without a germ, can develop life, let us answer at once, "Very likely. We read in the Mosaic cosmogony

that the earth was given a birth-power, and possibly something of it still remains. You think you have discovered evidence of that power : we can point you to the source whence it sprang. Like everything else in nature, it is of God."

Some will object to so generous a concession. The Bible does not admit of it, they say. The story of the origin of life is not all told in this first chapter of Genesis. It is given in the chapter following in greater detail. And the plain meaning is that the plants and trees that first stocked the earth were created full grown. "God made the earth and the heavens; and every plant of the field before it was in the earth, and every herb of the field before it grew. For the Lord God had not caused it to rain upon the earth; and there was not a man to till the ground; but there went up a mist from the earth, and watered the whole face of the ground." *

Few men have written upon the subject of creation who would be less likely to be suspected of any leaning toward the modern doctrine of evolution, and especially the doctrine of archegenesis, than would Rev. Dr. Murphy, of Belfast. He is so conservative as even to adhere yet to the notion of the six solar days. Yet in translating this famous passage he turns it completely end for end, and makes it read in exact accordance with the views above stated. In our version of the Scriptures it suffers a palpable perversion; and he sets it right. Moses is describing the earth, in this passage, as it was when first created. It was a lifeless world. It was a world without rain, or mist, or plant, or man. So Dr. Murphy reads,

* Gen. ii. 4-6.

“And not a plant of the field was yet in the land, and not an herb of the field yet grew. For the Lord God had not caused it to rain upon this land, and there was no man to till the ground.” For the remainder of the passage we give the translation of Professor Bush: “Nor went there up a mist to water the whole face of the ground.”

There is nothing here that tells us of plants and trees created full grown and then set out in the fields to grow. The passage, rightly understood, simply tells us what the condition of the earth was at a very early stage. It was a lifeless earth. It was a dry earth. And of course there was not a human being upon it. We easily find the answering form to this picture. Our planet was at one time, as to its surface, a cinder. It had just come out of the fire. At a later period the rains fell upon it, and the rocks were disintegrated, and a soil was formed in which sprang up all manner of vegetation; but it was not so at first. “Not a plant of the field was yet in it, and not an herb of the field yet grew. For the Lord God had not yet caused it to rain upon the earth, neither was there a man to till the ground; nor went there up so much as a mist to water the earth anywhere.”

The record in the second chapter thus perfectly agrees with what we found in the main narrative; and we may still cling to the doctrine that at God's call the earth was made causative, and evolved, generated, gave birth unto, or brought forth grass. Let the doctrine of archeogenesis, then, be established, if any one shall succeed in demonstrating it. It need not shake our confidence in the Bible at all. Moses has left an open door here, wide enough to admit that hypothesis and a good deal more.

CHAPTER XXVII.

MOSES AND MR. DARWIN.

IT is very unfortunate, when good men create unnecessary hostility between the Bible and Science. It was a pity that when Galileo saw that the earth was in motion, the ecclesiastical power of that day quoted Scripture against him, and compelled him to recant. It would have been a good deal better to have examined the Bible once more to see if, after all, it could not be fairly interpreted in a way to admit of the theory which Galileo had propounded. It was a pity, also, that such a man as Leibnitz should ever have allowed himself to attack the theory of gravitation, and to say that it was "subversive of natural, and inferentially of revealed religion." * And it is a pity that so eminent a man as Sir David Brewster should have pronounced in the same way against the nebular hypothesis, as he has done in his "Other Worlds." But this fashion of opposing the conclusions of science, on supposed Scriptural grounds, will probably prevail for a time yet, unless the humiliations to which it has brought the friends of religion begin to be more seriously considered.

It is not to be thought very strange, therefore, that so

* Quoted in "Origin of Species," page 422.

bold a thinker as Mr. Charles Darwin should have been somewhat opposed by good men. He has elaborated a theory, long in vogue in one shape or another, in which it is supposed that a great many things which we have been accustomed to regard as absolute creations are the product of natural law. A "few germs" may have been created, to start the system, as he believes; but after that, plants, animals, men, were slowly developed by natural selection, and by the necessary "survival of the fittest in the struggle for life." And he has accordingly been set upon as at least a probable atheist, and at best a babbler in science whom it is easy for the merest smatterer in that field to demolish. Perhaps he is wrong. Perhaps his brilliant theory, sustained by such a wealth of learning as he brings to it, and discussed with such singular candor and good temper on his side, may pass away. But, if it be demolished, it will be by arguments drawn from the field of science, and not by any supposed dictum of the divine Word. Moses, in his account of creation, by no means commits himself to the full, rounded development theory; but just as clearly he does not pronounce against it. He leaves the door open for any reasonable speculations any one may choose to indulge on that subject.

We have seen where such a door stands open for the doctrine of spontaneous generation. We find it in the account he gives of the origin of vegetable life; and a similar statement might be made of certain matters recorded further on, as, for example, where God says, "Let the waters bring forth abundantly;" and again, where he says, "Let the earth bring forth living creatures." These passages will come under review in a subsequent chapter,

and need not therefore be noticed any further here. Suffice it to say, that if there be room in this story for a belief in the development of mere earth-matter into life-forms, much more is there room for a belief in the development of one life-form into another. For between no two life-forms, however wide apart, is there so deep a gulf, and one that seems so impassable, as between a life-form and mere earth-matter.

Doubtless there are places in this first chapter of Genesis where we are held by the record inflexibly to the belief of an absolute creation. But it is not so as respects everything which Moses here records. Mr. Darwin, in his eager speculations, may also very naturally have overlooked the limits of his theory, and may have here and there ignored the divine interposition, where it really occurred. And it may also be true that while some very ignorant men upon the religious side in this controversy have, with more zeal than discretion, attacked the "scientists," men who hate religion have on the other side been pushing Darwinism in the direction of atheism. A system of science, however, is not responsible for the follies of all who assume to be its champions, and such a system may be sound as to its main features, though embodying some mistakes. The Copernican theory of astronomy was right; but there were some errors in it as first announced, which had to be corrected. And what some regard as Mr. Darwin's folly may be right as setting forth a general law of nature, while in some of its important details he may not have taken sufficiently into account the exceptions to the rule.

As to the matter in hand, if Mr. Darwin wishes to say

that our present vegetation all sprang from two or three germs, we need not take issue with him. Perhaps Moses had that very thing in mind when he specified those two or three things, "grass and herb yielding seed after his kind, and fruit-tree yielding fruit after his kind." Or even if Professor Tyndal, who would seem to go further than Mr. Darwin, and to deny the creation of the "two or three germs"—if he wishes to assign "a potency and a promise" to the earth-matter itself, we need not fly into a passion. Rather let us tell these men, "Make out your case and then come back to us and we will see how it may agree with the record. Perhaps we will show you plenty of room for your speculations in perfect harmony with the Word of God." God summoned such potencies to just such a work, as recorded in this account of the third cosmogonic day; and in response to that summons the great leap was made across the chasm between matter and life. The earth brought forth grass; and if that were done, is it too much to believe that the grass may have brought forth something else? The development hypothesis may be all wrong; but it is quite unnecessary for us to say that if it be not wrong the Bible is not true.

Whether the development theory shall work good or evil depends entirely on the manner in which it is handled. One use of the word evolution, says President Anderson, in his admirable address at the Evangelical Alliance, "is to name the process of growth in the universe, discounting from the word all reference to volition or pre-existing consciously-formed plan or idea." Of course, if the word be used in this sense, the doctrine covered by it may be atheistic. But, says the same eminent authority, the word

may be "a name for the process of the Almighty in developing the plan of creation—it being used simply as a name for the process of the creative energy under the control of Infinite Intelligence." In this sense, the word has no more an atheistic meaning than has the word creative. And, as President Anderson well remarks, "There is an unworthy timidity among many Christian men at these hypotheses, with which the scientific imagination is constantly teeming."

Mr. Darwin himself, in his "Origin of Species," says, "I see no good reason why the views given in this volume should shock the religious feelings of any one." And then to show in how friendly a way some religious men have been willing to meet him, he quotes from a letter he has just received from a "celebrated author and divine," saying that he has "gradually learnt to see that it is just as noble a conception of the Deity to believe that he created a few original forms, capable of self-development into other and needful forms, as to believe that he required a fresh act of creation to supply the voids caused by the action of his laws." *

Very similar is the language of Professor Tyndal. He seems indeed, at times, anxious enough to get rid of the idea of a God; but if that really be his wish, the struggle even with him proves vain. In his Manchester Address he says, "I have stood in the spring time and looked upon the sprouting foliage, the grass and the flowers, and the general joy of opening life; and in my ignorance of it all, I have asked myself whether there is no other power, being, or thing in the universe, whose knowledge of that

* Appleton's edition, page 422.

of which I am so ignorant is greater than mine." And he adds, "My friends, the profession of that atheism, with which I am sometimes so lightly charged, would be an impossible answer to that question."

A few additional excerpts from the utterances of eminent Christian scholars will perhaps sufficiently sustain the views here taken. Says President E. N. Potter, of Union College, in a letter to the New York "Tribune," dated December 4, 1875, "Writers of distinction in both Roman and Protestant churches have indicated that the hypothesis of evolution may be held, without any denial of the truth of Revelation. Besides the traces of some such notion, existing in Talmudic classics and patristic lore, competent scholars hold that the idea of evolution, not only in the successive periods of the Genesis, but in the progress from lower to higher forms, culminating in man, is readily reconcilable, if not in strictest accordance, with the original Scripture."

President McCosh, before the Evangelical Alliance in 1873, says, "In looking at these phenomena, men discover everywhere development or evolution. . . . I am not sure that religion has any interest in holding absolutely by the one side or the other of this question. I am not sure that religion is entitled to insist that every species of insect has been created by special fiat of God, with no secondary agent employed."

At the same meeting, Rev. J. C. Brown, LL.D., of Berwick-on-Tweed, in England, said, "All I know in regard to the vegetable kingdom is in accordance with this hypothesis; and facts which I have learned in regard to the animal kingdom are in accordance with the supposi-

tion that the work of creation in this kingdom has been analogous to what it has been in the other." At the same time Dr. Brown declared his acceptance of the general system of religion taught in the Shorter Catechism of the Westminster divines.

These citations are made, not in the interest of the development hypothesis, but in the interest of religion. That hypothesis may be true or false; that question must be decided upon purely scientific grounds; and it is most unwise for us to attempt to array against such a hypothesis the Word of God. That Word, rightly understood, is not against it; and speaking in general terms, were the hypothesis to be demonstrated to-morrow, the Bible would stand as unshaken as before. If Moses wishes to insist that there is a God, Mr. Tyndal himself will answer, "It is impossible to deny it." If Moses says that this system of nature had a beginning, the whole voice of scientific utterance in these days will be that "things look very much like it." And if Moses says that vegetation was induced by a germinating potency called for of God, what can those men respond but "amen," who have been so urgent in saying that they see in matter the "potency and promise of every kind of terrestrial life!" So, even as respects the latest born of our scientific hypotheses, the one so lately born that it is accepted even by its best friends as a hypothesis only, we find that there is plenty of room for it, and something more than a hint of it in the Mosaic narrative. Let scientific men go on. Let them raise their hypothesis to the dignity of an ascertained fact. Let their guess be shown to be a law. We shall only say in reply, that Moses walked upon that

road long before they ever discovered it, and that he has affirmed, in respect to the germination of plants from mere earth-matter, more than any scientific man can claim to have yet shown.

CHAPTER XXVIII.

GRASS, HERB, AND FRUIT-TREE.

AS it is not best, unnecessarily, to array the Bible against Science, so it is not wise to affirm that we have discovered in it any scientific statement unless we are quite sure of our ground. Such a statement has been supposed by some to be embodied in the above three-fold classification of vegetable life. The seedless plants, called "grass" in the old Mosaic record, and the seed-bearing plants, called "herb," and the fruit-bearing plants, have been spoken of as giving in outline a system of botany, identical with that of Linnæus, Jussieu, and DeCandolle. These, it was said, are the acotyledons, the monocotyledons, and the dicotyledons of their system. But, unfortunately for this pleasant view of things, that system is now regarded as worthless; and Moses' classification turns out to be merely a popular one adapted to Egypt and the East. The "grass" here, as elsewhere in Scripture, embraces those plants of lowliest form which float in the sea or spread themselves close along the soil. The "herb yielding seed" stands intermediate between the grass and the trees. And the "tree yielding fruit whose seed is in itself" stands simply conspicuous as the highest form of vegetable life.

It was once an opinion that all these forms of vegetation sprang up together, and flourished side by side. But this is not stated. They all appeared indeed on the third day; but they may have appeared successively. The lowest form of this vegetable life is mentioned first; and, for aught Moses says, may have appeared first; and there may have been a slow gradation of ascent from lowest to highest, so that as the highest form is mentioned last, it may have appeared last. The Book leaves that question entirely open. God made the earth to germinate all these sorts of vegetation on the third day; but in what order they came he does not say. Let our scientific men discover that if they can.

Well, they think they have discovered it; and their conclusions are marked upon every good geological chart. They tell us that these different kinds of vegetation appeared in an orderly succession,—the lowlier plants came first, and those of more elaborate structure afterward. They find the remains of these plants imbedded in the rocks: in the earliest rocks that retain any vegetable life-forms, the Algæ or sea-weeds; in those of a little later period, the Acrogens, including the ferns and the ground pine; while still later appear Gymnosperms, including trees; and latest of all, Angiosperms, or trees with fruit. This is the order as we find it marked in the rocks. It begins with the lower and simpler forms and rises by slow gradations to the highest. Everything does not spring into being at once and full-grown. It takes time. God is never in a hurry. All the ages are his own; and he delights to unfold his plans with deliberation. This succession of orders, in the field of vegetable life, reaches from the archæic epoch up to the very advent of man.

In one particular Moses in this narrative quite out-travels present discovery. It is a curious fact that while all geologists are agreed that in the natural order of things vegetable life ought to appear before animal life, yet they do not as yet discover it till animal life has first appeared. In the archæic rocks, says Professor Dana, we find "no distinct remains of plants." But he adds, "Animals of the lowest division of animal life were probably abundant." He gives an account from Dr. Dawson of one of these early tenants of the earth, called Eozoon, which he regards as a coral-making creature. He sees indeed in those early rocks certain substances, such as graphite and plumbago, which he believes to be of vegetable origin; but he says, "No distinct remains of plants have been observed." Those remains ought to appear. In due time some close observer will perhaps find them. But for a voice from science on this subject we have to wait. Moses says that plants appeared on the third day, and animals not till the fifth. And perhaps at some future day our men of science may be able to say from actual observation what already they generally believe, and what the inspired writer so confidently affirms.

It is important to keep in mind here what has been already noticed of the method of Hebrew narrative. The successive chapters of such a narrative lie often, to a considerable extent, parallel one with another. The narrator moves down by topics; and, having taken up a theme, he finishes it. His next theme may begin very soon, in time, after the one began which he has finished, but he pays no attention to that. He completes what he has to say on the first subject, and then goes back to take up the next.

Thus the two will frequently stand for a long distance side by side.

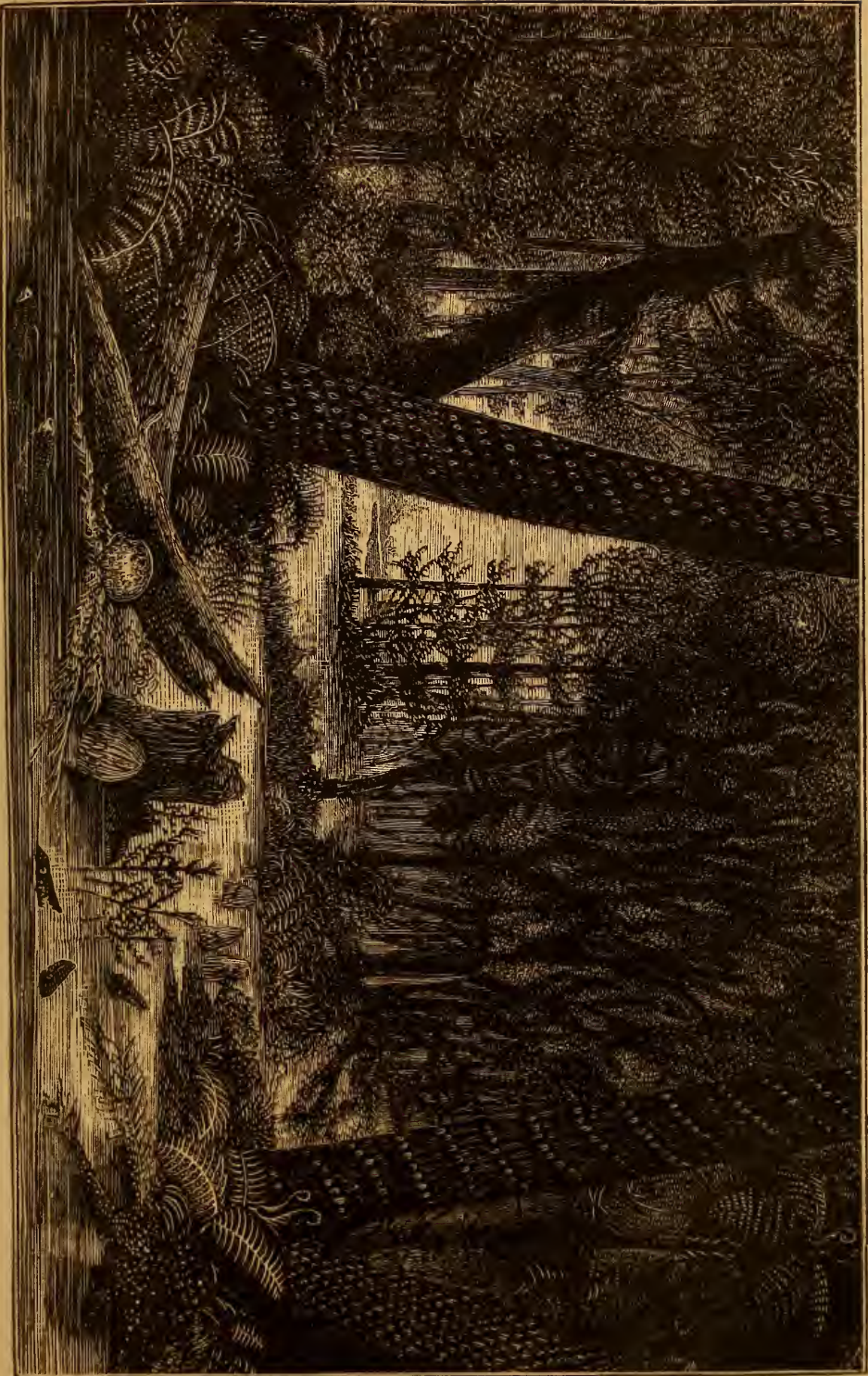
So stand the two creations of this third day. The one is the uplifting of the continents; and when the sacred writer begins to speak of it he follows it up to the end. The other is the production of vegetable life; but this begins long before the other is ended, and goes along side by side with it. As the land is lifted above the water, the sediment deposited along the shores begins to develop a low order of vegetation. The seas are hot yet, but there are kinds of vegetation which can grow in water at a very high temperature. The germination of plants therefore follows very close upon the beginning of the uplift. The continents increase in size, and the orders of vegetation increase in number, and improve in character. So the two processes go steadily on together. The first day, the second day, and the third, are all in progress at the same time. The opening of the light, the fitting up of the atmosphere, and the double work of uplifting the land and starting new orders of vegetation, though successive as to their beginnings, are as to their chief history quite contemporaneous. They come in like the opening of an overture, where a single instrument sounds first, and one by one the others fall in till we have the full chorus.

CHAPTER XXIX.

THE NOONDAY OF VEGETABLE LIFE.

THERE was a period in this creative history when vegetation flourished in amazing luxuriance. It was not a time when the choicest products appeared, but a time when some of the lowlier creations assumed a particularly stalwart growth. It was not a time of many timber-trees, and of gorgeous blossoms, and of luscious fruits, but it was a time when every continent was massed in one green wilderness, which wrapped as in a thick and furzy fleece the very farthest poles. This is what we mean by the noonday of vegetable life. Geologists speak of it as the carboniferous era, the name being given on account of the immense quantities of carbon condensed at that epoch into vegetable production, and stored up for the ages that should come after.

To understand this period we must carefully note three things. The first is, that our atmosphere, as already stated, was at an early period overloaded with carbonic acid gas, and that while in such a condition it would have been immediately fatal to any air-breathing animal. The second thing to notice is that this gas, which is so very noxious to men and animals, is essential to the growth of vegetation; and that where it abounds vegetation is great-



FOREST OF THE COAL PERIOD.



ly nourished. And the third thing to be noticed is, that if vegetable matter be massed together in proper conditions, it parts with its other elements, retains only or chiefly its carbon, and so becomes coal. The carbon in one pound of coal is sufficient, if set free by combustion, to suffocate ten men. How suffocating, then, must have been the atmosphere, when it carried all the carbon, now solidified in the vegetable growth of the world, and in addition to this all that is contained in all our mines of coal.

But this condition of things greatly favored the growth of plants. We feed our grass and grain by enriching the soil; but in that age God fed the plants he had created by fattening the atmosphere. They breathed in richness at every pore. Moreover, that was an age when moisture was abundant. The continents were as yet half submerged. There were mists and showers coming and departing. There were wide land-locked lagoons. There were broad shallows along the shores. Amid this moisture the new life grew rampant. Besides, it was an epoch of great warmth. The earth-crust was not yet cooled as it is now, nor were there at the poles any great masses of ice and snow. The presence of carbonic acid gas in the atmosphere, moreover, as has been asserted by Professor Tyndal, is a great check upon radiation; and in an age when it was so abundant the earth was like a great greenhouse, roofed with a crystal covering from pole to pole. A tropical climate, therefore, prevailed everywhere; and, betwixt light and heat, moisture and plant food in the atmosphere, vegetation reached a gigantic growth.

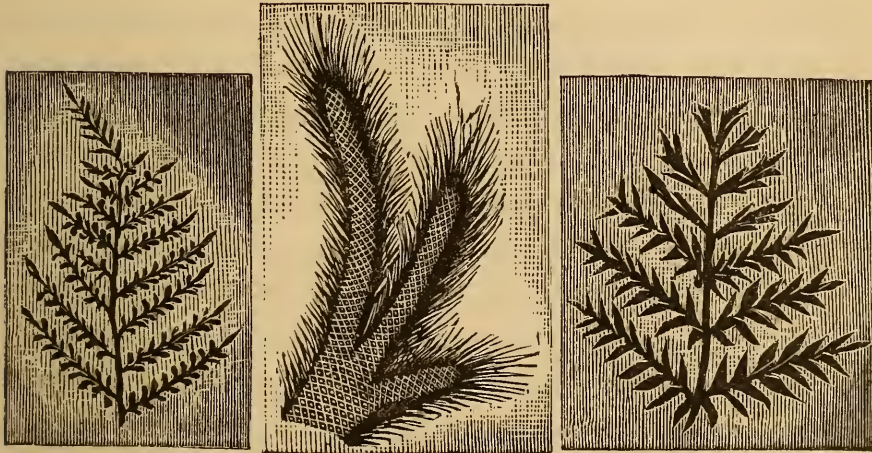
Things which we are accustomed to see among our smallest and lowliest vegetable productions then shot up

into enormous stature. There were rushes which grew thirty feet high. There were ferns which presented single fronds six and eight feet long. And club-mosses towered aloft like palms, or formed jungles in which a tiger might have made his lair, or a man have lost his way. The timber-trees, except a few pines, were not there—the oaks, the chestnuts, the cedars, the rosewood, the materials for ship-building and for house-furnishing, were wanting; for there was as yet no use for them. All that would come in good time; for the present it was sufficient that the earth produced a kind of vegetation which would make good coal. Every energy of that age was turned to that important economy. It was the day of coal-making.

The process by which the coal was formed from this material is as interesting as was the growth of the vegetation itself. Successive forests of these productions having arisen and fallen one upon the other, there came a change which heaped up the great mass as in a coal-pit, and covered it deep beneath the soil. The earth-crust was unsteady yet. Frequent convulsions were occurring. Here the land suddenly rose; there it sunk as suddenly away, forming a great basin; and in came the sea, carrying with it gravel, detritus, sediment, and rock, which were heaped upon the accumulated vegetation. Then it fermented, and grew hot; still more encouraged by the hot rock underneath where it lay, and by the tepid seas that rolled above. It was roasted as in a coal-pit. It grew black and pure, and was pressed by the superincumbent weight into solid form. Then another upheaval occurred, and all was lifted again out of the sea; and when man appeared, he found it—a bed of coal. In some places the

process was repeated again and again, so that we have coal beds one above another; and it shows what an enormous mass of vegetation was consumed in this process, that in one seam of coal only six inches thick, near Pittsburgh, Pa., it is estimated that more carbon is to be found than at present rates is taken out of the atmosphere by all the vegetation of the globe in 1,200 years.

A visit to a coal-mine will more than confirm all that is here declared. You may find there the print of those great fern-fronds as delicately marked as if the plant



FOUND IN COAL.

itself had been preserved in an herbarium. You may find your gigantic rushes there, and the great club-mosses; and, in some cases, you may find tree-trunks erect there, with the roots still standing in the soil on which they grew. "These fossil-stumps," says Dr. Dawson, "are not uncommon in the roofs of coal-seams. In some places they are known to the miners as 'coal-pipes,' and are dreaded by them in consequence of the accidents which

occur, from their suddenly falling after the coal which supported them has been removed. An old friend and helper of mine in carboniferous explorations had a lively remembrance of the fact that one of these old trees, falling into the mine in which he was working, crushed his leg and gave him a limp for life." *

This was the noontide of the third creative day. It was the time when God was slowly removing from our atmosphere its deathly quality, and transmuting those noxious gases into the solid treasures which we find in our mines of coal. We have learned how to build ice-houses, and so to carry over the superfluous frigidity of our winters into midsummer, and use it then. In the same way God stored up in these great coal-cellars the superfluous heat of the carboniferous era, and we bring it out to warm our dwellings against the rigors of the winter air. Nor is this all. There is sunshine in that black coal. God laid up for us the unused brightness of that far-off day; and we bring it out, to blaze again along our streets by night and to fill our homes with cheer. There is even more. Coal is energy — solid energy given out by the brightness of that early period, and kept in store for our day. And we have learned how to unbind that energy, and make it drive our rail-trains across the continents, and our steamers across the seas. Solid light, solid heat, solid energy — these etherial things packed away in portable form — heat, light, energy that enter into almost every product of modern civilization, measured by the cubic foot and weighed out and sold by the ton! This is what God was laying up in store for us when he massed together that wondrous

* "Earth and Man," page 141.

vegetable growth which appeared on this carboniferous noonday.

Says Professor Huxley in the "Contemporary Review," "Nature never is in a hurry, and seems to have had always before her eyes the adage, 'Keep a thing long enough and you will find a use for it.' She has kept her beds of coal for millions of years without being able to find much use for them. She has sent them down beneath the sea, and the sea-beasts could make nothing of them; she has raised them up into dry land and laid the black veins bare, and still for ages and ages there was no living thing on the face of the earth that could see any sort of value in them; and it was only the other day, so to speak, that she turned a new creature out of her workshop, who by degrees acquired sufficient wits to make a fire, and then to discover that the black rock would burn. . . .

"Nature still waited for a return of the capital she had invested in the ancient club-mosses. The eighteenth century arrived, and with it James Watt. The brain of that man was the spore, out of which was developed the steam engine, and all the prodigious trees and branches of modern industry which have grown from this. But coal is as much an essential condition of this growth and development as carbonic acid is for that of a club-moss. . . .

"But what becomes of the coal which is burnt in yielding the interest? Heat comes out of it, light comes out of it, and if we could gather together all that goes up the chimney and all that remains in the grate, we should find ourselves in possession of a quantity exactly equal in weight to the coal. Nature is paid back, principal and interest at the same time; and she straightway invests

them (materials) in new forms of life, feeding them with the plants which now live. Thrifty Nature! Surely no prodigal, but most notable of housekeepers!" It is not mere nature, however: it is God that worketh all in all.

CHAPTER XXX.

THE OPENING OF THE FOURTH DAY: SUN AND MOON.

WE have now completed the first creative Triad, and must enter upon the second. The first three days, the last of which is a kind of double day, are disposed of: three more remain, and the last of these is a double day also. Day number four: that is the point at which we begin in this chapter, and it opens, as did "Day One," with a call for light. For the first day God said, "Let there be light:" for the fourth day he says, "Let there be lights!" In response to the former call, the great, dark, nebulous mass became luminous: in response to the latter the sun began to blaze in the open sky. The lights for which God called, as this day was about to open, were the sun and the moon. The stars come into notice also, but only parenthetically, as it were, and at the close of the sixteenth verse of the chapter.

The sun and moon are called "great lights." This illustrates the method of the writer. He describes things in perspective, taking his stand on the earth. There are fixed stars many times greater than our sun, but they are so far distant that they seem much smaller. And the moon, which is very much the smallest of the heavenly bodies visible to the naked eye, seems great because it is

so near. Moses paints his picture like a true artist, giving those objects largest room on his canvas which occupy most space in the general field of vision. He gives us a photograph of the sky as it would have been taken had there been a photographer to catch the picture when sun, moon, and stars first appeared. The moon, though actually very small, stands in the picture large. The sun, though not the largest object visible, is represented as the largest, because such was the picture in the sky. It will be worth something to remember this hereafter; Moses takes his stand on the surface of the earth, and paints things as they there appear.

The "lesser light" of the two chiefly mentioned is said to "rule the night." This is perspective again, and the picture is photographed once more. The moon is in the sky as much by day as by night; and it is visible, too, if we will take the pains to find it, but it is not so distinctly marked in the picture. The sun outshines it. Few notice it. It is not the ruling orb. But when night comes, the scene changes. Now the moon begins to shine; and sometimes its brightness is so great as almost to extinguish the stars. Milton noticed the queenly attributes of the moon, and certainly she rides conspicuous among the heavenly bodies that go careering across the sky.

If we descend from our picture to the reality of things, of course we have a different story to tell. We find the moon to be a globe essentially like our own. It is made up of much the same material. It is passing through the same geological history. And as there stand upon our earth-rocks marks of the changes which have occurred in

our planet, so the telescope reveals to us on the moon's surface marks indicating the convulsions that luminary has experienced, and the utter barrenness to which it has come.

According to the nebular hypothesis, the moon was once a part of the general mass now forming our planet,



LUNAR CRATER.

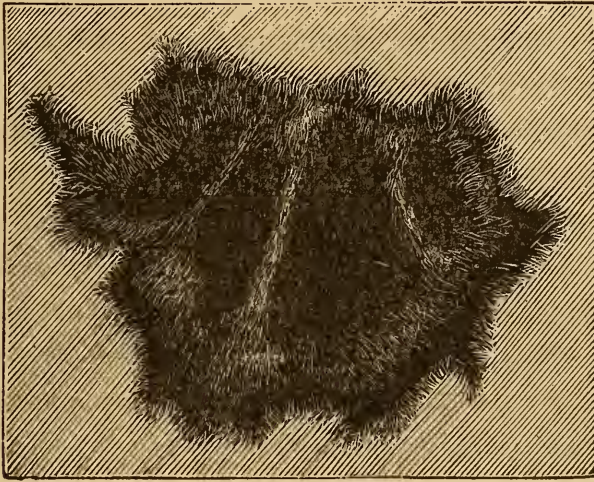
and was thrown off by the rapid revolution of that mass, as a drop of water might be thrown off from a swiftly revolving wheel. In its earlier stages it passed through the same conditions of molten rocks, crust-surface, and perhaps of condensing vapor and general submergence,

through which we have traced our own world. But being a smaller body than the earth, it has cooled more rapidly, and in its present state gives us a dismal prophesy of what our world will perhaps yet become. Its atmosphere has quite disappeared. Its seas have quite sunk away into the rocky recesses beneath. Its internal fires have died out, and its surface is mottled with the craters of long-extinct volcanoes, which indicate what tremendous forces were once acting there. Of course no life remains. It would be curious to see a piece of rock from the moon. We should examine it with microscopic carefulness, and it might tell us a most interesting story. It might be a sedimentary rock, and so speak of the seas that once washed those now desolate shores. It might even contain a fossil to indicate what sort of life once reigned there. But at present we can only see that it is an unclad world; a frozen, barren, dead, inhospitable world, of no use to itself, and important only in its bearing upon other parts of the solar system.

We could not very well dispense with this little satellite, however, poor as it is. How cheerily it lights up our dark nights! How mightily it pulls at our ocean waters, as they pass every day beneath its mysterious sway, giving us our tides! How well, too, it serves its purpose, when the mariner takes his reckoning from it; and what an important work it does, keeping our world in proper balance as we journey round the sun! Dreary, broken, lifeless thing, yet what a mission it fulfills, and how well its work is done!

The "greater light" was appointed to a more joyous service, and affords us a more inviting study. This is the

sun ; and in many respects he presents a strong contrast with his milder sister. The moon was flung off from our world ; but our world was flung off from the sun. The sun was never to us what the moon is ; but our world was once the same, perhaps, to the moon that the sun now is to us. The sun is a blazing star. So was our own world long ages ago ; and the moon of that day, basking in the nearer brightness and the warmer glow, may have had its



SUN - SPOT.

life-forms, as our world has now. The moon is only about 240,000 miles distant from us : the sun is more than 90,000,000 miles away. The moon is only about 2,000 miles in diameter : the sun is more than 800,000. The moon's entire bulk is only about one forty-ninth part as great as that of our globe : the sun's entire bulk is more than a million times greater than that of our globe. The solid body of the moon is in plain sight—its rocks, hills, craters, empty ocean beds : the solid nucleus of the sun is not in sight, but only the blazing envelope that incloses

it. This envelope is, indeed, rent apart at times, so as to show us what we call spots on the sun; but we only gaze down into darkness as we bring one of these spots under our telescopes, and can gain little idea of what may be there. By the observations made during eclipses of the sun, it is discovered that outside the blazing envelope of the sun there is a kind of atmosphere; and this atmosphere is seen to be wondrously upheaved by storms. Jets of crimson brightness, supposed by some to be burning hydrogen, sometimes shoot up from the sun's surface when these storms are raging, that reach an enormous height. Professor Swift, of Rochester, says, "These jets were seen by others and myself, during the great eclipse of August 7, 1869, extending to the height of 80,000 miles." We analyze this brilliant mass by means of the spectroscope, and find out what the sun is made of. Hydrogen, vapors of calcium, magnesium, sodium, iron, nickel, and very many other metals record themselves, besides one or two substances not known to our planet. Line 1,474 spectrum has no terrestrial representative; but for the most part, the sun is made up of chemical substances with which we are familiar.

The sun obeys the same laws and is working out the same geological history, apparently, as our planet. But, on account of its immense size, it lags behind in the race, and is to-day where our world was ages ago. If the present order of nature continues, however, it will at length become, in some important respects, a world like ours. Its luminous envelope will disappear. Its intense heat will abate. It will have its day of rock-crust, and perhaps of storm and boiling seas, and then a detritus will form,

ready for the production of vegetable and animal life. How it will be furnished with light in that day, it would be difficult for us to conjecture; but if that were provided, there is no reason why life should not yet flourish upon the sun, even as it does here.

But when that epoch is reached, what will have become of our world? According to certain intimations of Scripture, it will be swept by and by with a cataclysm of fire; but that has been its experience more than once already. The general tendency of all the heavenly bodies is toward refrigeration. And long before the sun cools down sufficiently to sustain life, our planet will probably be a cold, desolate thing, like the moon. We need not fear that this change will very soon overtake us, however. The cooling process is very slow; and it has been ascertained that the mean temperature of the earth is not at present diminishing more than about the one three-hundredth part of a degree in 2,000 years.

CHAPTER XXXI.

WORK OF THE FOURTH DAY : WAS IT A CREATION ?

“AND God made two great lights. And God set them in the firmament of the heaven to give light upon the earth.”

Many persons have read this statement as if it indicated that the sun and moon were not in existence until this fourth day. But we are not shut up to this view of the case, and there are good reasons why we should take the passage in a different way. Professor Bush says that this part of the narrative may be taken as parenthetical, and may be read as follows : “For God had made two great lights,” referring to the original act by which he created the heaven and the earth. Dr. Murphy presents a similar view. “The heavens were created at the absolute beginning of things recorded in the first verse ; and they included all other things except the earth.” And Dr. Tayler Lewis says that “the sense of *made* is limited by the infinitive that follows—He made them to rule.” He cites a parallel passage from Ps. civ. 19, “He appointed the moon,” etc. Indeed, there is scarcely any difference of opinion among writers on this subject. The word *asa*, usually rendered *made*, here signifies not a creation, but either an appointment to a purpose or a bringing out into use, or else it refers to the original creation, and has no

reference to any creation on this fourth day. The sun and moon, as to the matter composing them, were in existence long before this, and were now simply set to do their work with reference to our world. They were not a sun and a moon to our planet, in the sense they now are, until this epoch. To one standing on the surface of the earth, they would not till now have been visible in the sky.

Hugh Miller, who supposes each creative day completed before another begins, puts this day after the carboniferous epoch, and supposes that up to this time there had been no clear sky. There had been light indeed, as he holds, shining through the clouds : and in such light was it that the enormous growth of the coal period flourished ; but it was not bright sunshine. It was a period of "warm, moist, cloudy weather." Then the sun came out, and that constituted the fourth day. To a man standing on the surface of the earth, and witnessing this sudden appearance of the blue sky and the heavenly bodies, it would have been a new creation. The natural exclamation of such a man, beholding the vision as Moses beheld it, would have been, "This is a new creation of God!"

But we are not obliged to resort to this theory. We can understand these days as overlapping each other ; and this one may have begun long before the previous day was ended. Before the coal period, before animal life appeared, while vegetation itself was but just beginning to appear, this fourth day may have dawned. In accordance with this view, Professor Guyot dates this epoch from the disappearance of the earth's photosphere. This photosphere was an envelope of great brightness that once encompassed our planet, of which our Northern Lights may be

regarded as the feeble and intermittent remains. That the sun has such an envelope we have already seen ; and on the nebular hypothesis, the earth preceded the sun in each of its historical changes. Professor Guyot holds that vegetation began to spring up here before that luminous envelope was swept away. While light came in upon our planet from this source, there was no need of the additional light of a sun ; nor could either sun or moon or stars have been seen. This fiery sky shut in the earth like a shell ; and in so doing it shut out everything beyond. But gradually there came on a fading of this brilliancy ; and as it disappeared, the sun began to shine forth. It is only a bare supposition ; but if we might imagine that the sun was not lighted up as it now is, till our world was first deprived of its corona, we should have the problem of the fourth day beautifully solved. The sun being so much larger than our world is of course far behind it in all its geological changes ; and if we might suppose that it first became luminous at this epoch, we might say that it was no sun till the fourth day. On that day God made a sun. Previous to that it was an unfinished work.

And while this would make it correct to say that the sun, as a sun, was not made till the fourth day, it would also give special significance to that dividing work of which so great account is made in the sacred story. " Let there be lights in the firmament to divide the day from the night. And God set them in the firmament of the heaven to divide the light from the darkness." So says the record. And if the somewhat doubtful supposition expressed above were admissible, these words would have great significance. On the theory of Hugh Miller, there

was as distinctly marked a division between day and night before this fourth day as afterward. The solar days were cloudy indeed, but each had its beginning and its ending as really then as now. But, if Professor Guyot's views be taken, then there was a long period previous to this day's work when there was no such thing as a division between day and night for our world. There was brightness always and everywhere. The whole heaven was flooded with it. Our globe was perhaps turning on its axis then as now; but there was no dark side to it, and so the revolution that now makes day and night was without effect. From east to west, from pole to pole, for long ages together, this blazing shell shut in our world, and one broad glare of fiery sky lit up the scene.

A change was needed. Such creatures as God proposed to introduce upon our world would need alternations of day and night. Men, animals, even vegetation itself, if it were to develop into any such forms as God intended, would need frequently recurring periods of darkness. Every life-form was to be constructed on the plan of alternation and periodicity; and to meet this necessity that eternal glare needed to be made to subside, and in place of it there needed to be established a division of night and day.

This was done by the work of the fourth day. Our photosphere died out; and, so far as that was concerned, our world was left dark. As that occurred, the sun came into view, and our globe was lighted from one side. On went the diurnal revolutions the same as before, and that brought every part of the world into alternate light and darkness once in every twenty-four hours. This fourth

day did not begin away down this side the coal-period, as Hugh Miller supposed. It came in after the first faint dawn of vegetable life. That life had already begun to show itself, in some low form, along the margin of the yet hot seas; but now it was to spring up magnificent all over the globe. This mighty sun was to urge it on. These alternations of day and night were the conditions established to give it full development. And, not for this only, but for the sake of that other kind of life which was now immediately to appear, God extinguished the earth's corona, and hung up instead the sun to blaze in yonder sky.

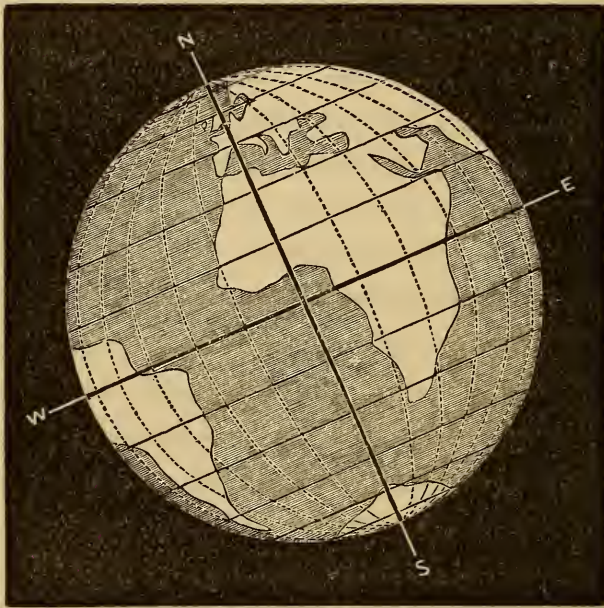
CHAPTER XXXII.

THE SUN AND MOON AS TIME-KEEPERS.

“AND let them be for signs and for seasons and for days and for years.” First for signs—signals, by which to regulate human affairs. Men would perhaps exaggerate this view of the heavenly bodies, and would find in them “signs” in the superstitious meaning of that term. But, signs they were to be, nevertheless; and this office was to be one of vast importance. Notice its effects on human industry. The special work at first given to our race was agriculture. Man was put into the garden “to dress it and to keep it;” and except as agriculture is sustained, civilization must decay. But agriculture in such a world as ours must be regulated by periods. When to plough and when to plant, when to look for a ripened harvest and when for the coming on of winter, are vital questions to men who till the soil. These things must not be left to guess-work: there must be something to depend upon. Therefore God arranged the apparent motions of the heavenly bodies, and most of all the sun, so as to give a signal, at the proper time, for each of these things.

This shows what is meant when it is also said that these time-keepers shall be “for seasons.” It may be that so

far as the moon is concerned, these seasons were to be religious festivals, such as for so many centuries have been regulated in the Jewish church by the lunar changes. But when the sun is considered, the seasons spoken of are the great natural divisions of the year. The apparent change of place which the sun performs in the heavens indicates the coming in of the four great seasons of the year. It more than indicates it: the seasons are created



THE EARTH AT THE VERNAL EQUINOX.

by these changes. The extreme simplicity of the arrangement was not, perhaps, understood by Moses; but the important facts of the case did not escape his observation. One important office to which God appointed the sun was to bring in the seasons of the year.

It would have been perfectly easy to send the earth round the sun in such a way as to induce no change in

the seasons at all. Indeed, that would have been in a high sense the natural way; for unless some disturbing influence came in, equator and ecliptic would exactly correspond. But by some means God tipped the axle of the earth a little from its natural position; and out of that comes that various exposure of different parts of our globe to the sun's rays, which creates our spring, our summer, our autumn, and our winter. This is important. It not only introduces an agreeable variety in our experience, as these seasons change, but is useful in training us to forethought. Nay, the arrangement is even more important than this; for without these changes our world could not have been as now the seat of a flourishing animal and vegetable life.

“The vegetable clock is wound up to run just a year.” And certainly some of our choicest kinds of vegetation need exactly this alternation between summer's heat and winter's cold. The fruits of our temperate zones will not flourish in the tropics, nor can we reproduce our thick, green turf there, to beautify the soil. True, other things appear in those lands of perpetual summer, which somewhat take the place of our accustomed products in these changeful zones; but we should have been great losers in this direction had there been no alternations in the seasons of the year. The same may be said of animal life. In many of its forms it requires the same change. Bird and beast pair and mate and nest and rear their young, even as the trees put forth their leaves and flowers, with the opening of the year. And in winter all quietly repose in some sort of at least partial hybernation. Man himself is so constituted as to need these changes, and generally

quite runs down, if he lives where either summer or winter alone perpetually prevails.

Time-keeping may seem a very humble service to which to set so magnificent a piece of furniture as the sun. Time-keeping can be done by machinery of our manufacture. Would you set the heavenly bodies doing the work of a wooden clock? Yes, perhaps; only they might do it better. God made them for signs and for seasons and for days and for years. Other uses to which they are put may seem more grand, but in nothing do they serve us better than in keeping time. "Every one must see," says Tayler Lewis, "that the exact knowledge of years and times and eras constitutes one of the great differences between the civilized and savage state, even where such knowledge is regarded as simply affecting those outward utilities that depend upon accurate canons of time. Next to the Bible, the most important book for the human race is doubtless the almanac. Without an accurate measurement of the day and year there could be no chronology; without chronology there could be no history; without history there could be no national or generic experience; without such experience there could be no progress; and without progress there could be no civilization." *

If, next to the Bible, the most important book is the almanac, certainly for man in his present stage of civilization the most important instrument is a well-regulated clock. The clock and the almanac—these are the great regulators of mundane affairs. Imagine that with all our present variety of business in hand, we should by some strange mischance lose our reckoning. We cannot tell

* "Six Days," page 186.

whether it be August or September. We do not know whether it is the 8th of the month or the 28th. What would be the consequence? Who would answer for the commercial disarrangement which would grow out of it? What would become of the value of notes, mortgages, bonds, or the process of payments and banking? Or let the same confusion occur in regard to the day of the week, or the hour of the day. We cannot tell whether it is Sunday or Tuesday. We are not certain whether it be ten o'clock, or eleven, or twelve. What becomes of our rest-day? And by what rule shall we start our steamships on their voyages, or run our rail-trains across the continent? One week without these time-markers would throw everything into confusion. One year of that kind of life would arrest, if not abolish, our whole civilization. Nor would it be difficult to show that our thought itself is so regulated by this constant time-beat, that in the absence of it our inner machinery would all run down, and our souls become chaotic and our life a dream.

It was no small thing, therefore, which was done for us, when a great clock was constructed and hung up in the sky. God's clock has two hands. The sun-hand gives us the long measurement and the moon-hand the shorter; and each has its subdivisions peculiar to itself. We have time-pieces of human contrivance which we regard as quite marvelous; because they give not only the minutes and the hours, but because they give us the day of the week and the month of the year. But God's clock gives us, by the small hand, the lunar month and the moon's quarters, very nearly marking off, also, the week, besides the rise and fall of the ocean tides; while by the

large hand we get the year, the vernal and autumnal equinox, the summer and winter solstice, the four seasons, and the days and fractions of a day, down to the mere fragment of a second.

Every chronometer of human construction takes its time-measure from these chronometers in the skies; and as every such time-piece needs frequent winding up, so is each liable to many accidents, and subject to more or less inaccuracies. A watch that would run for a year without gaining or losing five minutes of time, and one that for the whole year would not once need rewinding, would be quite a marvel. We are obliged to take good care of our time-pieces, to brush the dust from the wheels, and to feed them now and then with fresh oil. We regulate them by a "regulator;" and, in the last resort, regulate all the "regulators" themselves by the sun. There we find a common standand, and one upon which we can always depend. It needs no dusting. Its wheels never stop for want of oil. Its motions began, who shall tell what ages ago? and with what perfect accuracy its movements occur, let any one calculate who can, after noticing the nice predictions of the astronomers, and their subsequent fulfillment, when there occurs a transit of Venus, or an eclipse of the sun.

"A single evening's watching," says Dr. Burr, in his "Ecce Cælum," "is enough to show us that the axis of the earth points nearly at the North Star; that the motion around it is easterly; that it is a perfectly uniform motion, just the same distance being made in the same time. So much a single evening can show us. But it would take a great many evenings to show us another striking fact,

none the less sure, viz., that the axial revolution is always performed in exactly the same time. It is in evidence that our day has not varied the hundredth part of a second in two thousand years."

So closely runs the great chronometer. And it is liable to no accidents, and it never runs down.

CHAPTER XXXIII.

HE MADE THE STARS ALSO.

THE first chapter of Genesis was written for an immediate purpose. It was intended indeed to reveal to after ages the true account of creation, but it was also intended as a protest against the prevalent idolatry of those times. The age in which it was prepared, and the nation among whom the writer and his people had been dwelling, were madly set upon the worship of false gods. Among the objects of idolatrous worship, were the heavenly bodies. In this chapter, therefore, the writer teaches that these supposed deities are only a part of the general order of nature, each having been created by the one true God. Of the sun and the moon he takes the more particular notice, because they were not only conspicuous objects, but because they stood very high in the Egyptian Pantheon. Not to omit anything, however, that might be seized upon in the heavens for idolatrous worship, he adds a sentence to the general account, saying, "He made the stars also." He had said this in effect at the beginning of the chapter; for when he said that "God created the heaven," that of course included all the heavenly bodies. But here he makes up his items; and, to leave nothing out, he adds, "the stars also."

By the phrase "the stars" he means to designate all those apparently smaller lights which appear in our sky. Strictly speaking, the sun is a star; and, in the same sense as are some of the other bodies included in this term here, the earth is a star, and so is the moon. But the writer draws his picture in perspective once more, and calls those things stars, and only those, which seem such in our evening sky. Everything shining at any time in our visible heavens, except sun and moon, is in this view a star.

Observation soon shows that these stars are of two or three general sorts. Were you to stand upon the deck of a ship in mid-ocean, where there would be nothing to interrupt your vision, and watch these twinkling points, you would see them all moving slowly from east to west across the sky. One after another, they would climb up out of the eastern horizon, ascend the blue vault over your head, and then go down in the west till they seemed to sink beneath the water. You would notice the remarkably straight course each one pursued. You would see how precisely they kept their relative distances, the one from the other. And you would observe the exact time in which they all moved. Regularity, uniformity, persistence each in its course—these, to your mind, would seem the attributes of the stars. And if you ever spoke of "the stars in their courses," the phrase would represent immutable law.

But if you were very accurate in your observations, and if you were to keep up your deck-watch for several nights in succession, you would at length find a star somewhere that seemed to have fallen out of its place, and if you continued your observations for some years you would see

still more. One night a star would be behind time ; another night it would be ahead of time ; and now it would turn out from a straight path a little on this side, and now on that, making a zig-zag course across the sky. And, after a little, very likely you would discover another such star, and then another, till perhaps you had found half a dozen in all, whose movements were so uncertain that you would not know what to make of them. You would see something like 3,000 stars, each of which kept its place from year to year ; and which you would, therefore, naturally call "fixed stars." But there would be these half dozen curious, erratic things, which the Greeks used to call *planetai*, and which we call planets or wanderers, which would give no account of themselves.

There would be a third class. Some fine night you would encounter a strange visitor in the sky. Very likely he would seem larger than any star in the firmament ; and there would be a long train of light behind him ; and, this train in some cases resembling a great lock of white hair, you might be disposed to call him Coma, the comet, the hairy creature. Such strange visitors in former days created great consternation among men ; and many were the objurgations and excommunications by which they were bidden to begone. We are not so well acquainted with them even now as to be able to satisfy all our curiosity in regard to their movements ; but they are no longer feared as likely to do us any harm.

If your night-watch should occur about the middle of August or of November, you would be likely to witness the coming and going of still another kind of "star." It would start suddenly from some point in the heavens, and

shoot rapidly to another point, leaving a bright streak behind it for an instant, and then disappear ; and so you would call it a shooting star. These shooting stars sometimes fall to the earth, where they are picked up and examined. They are called in that case *meteorites*, or meteoric stones, and are sometimes of great size. There is one in the British Museum that weighs three tons.



GENERAL VIEW OF A COMET.

But generally they are very small ; and being small they burn up, as they come into our atmosphere, and never reach the earth. Great numbers of these objects are supposed to be performing a journey round the sun, the same as our world does ; but only here and there one comes near enough to us to be seen ; nor indeed would they be seen at all except as they are set on fire. They

ignite by friction against our atmosphere, just as a match ignites when you scratch it on the wall.

It has been ascertained that the orbits of these meteorites correspond very curiously with those of the comets; and some hold that comets are but clouds of meteorites traveling together. "The observations made on the beautiful comet of 1874," says Lockyer, "have shown that possibly the heat and light of a comet may be due to the clashing together in space of these very bodies which, when they fall into our air, give rise to the appearance of falling stars. For we know that comets are not very hot, that they do partly consist of solid particles or masses, and that the vapor given off is that of a substance known to exist in meteorites."

So then we have four kinds of "stars,"—the fixed stars, the planets, the comets, and the shooting-stars. They are all interesting objects of study; and in each we may learn some lesson of the power and the goodness of God. But the comets and the shooting stars are of less importance apparently in the system of nature, and may therefore be dismissed from the present studies. The planets and the fixed stars, however, must have our more particular attention.

CHAPTER XXXIV.

THE SOLAR SYSTEM.

IT was observed, at a very early date in the history of astronomy, that each of the *planetæ* accomplished a perfect cycle. That is, though it was apparently subject to great irregularities, it always came back at length to the place where it began, and what seemed irregularities, followed each other in an orderly succession. This showed that there was a law in the case; and many were the attempts made to give that law expression. For a long time, however, it was assumed, as the first and undeniable postulate in this problem, that the earth was stationary. Had we not the evidence of the senses for it? Was the ground ever known to tip toward the east or toward the west? Were the seas ever emptied out of their basins? Did men ever find themselves with their heads downwards? Nay, was it not running against Scripture itself to believe anything else; for is it not written that "the world also shall be established, that it shall not be moved"?* So this was the starting point in all investigation with respect to the motions of the planets—the earth is established that it can not be moved.

Of course, it followed from this that the earth was the

* Ps. xcvi. 10.

centre of the universe; for if it did not move, then sun and stars moved round it, and that with prodigious velocity. But those planets, what could be done with them? Cycles and epicycles, spheres and superior spheres, all this was brought into account, and the problem grew more and more complicated, until at last a man arose who ventured to suggest that the earth itself might be one of the *planetæi*, and that the central immovable object in the system was perhaps the sun. This was Copernicus. Taking a hint from certain speculations of Pythagoras, he proceeded to evolve his system. His calculations were not perfect; and it needed the after work of Kepler, Galileo, and Newton to complete the system; but from Copernicus it took its name, and is now the recognized system of the astronomers of the whole world.

It might well have been that the movements of the planets should seem irregular, when seen from our world; for we ourselves are also in rapid motion, and that in a two-fold direction. Whirling continually on its own axis, and flying at the same time like an arrow on its orbit, our planet would seem to present a very unstable standing-place from which to make accurate observations; but the difficulties were successively overcome, and the problem was demonstrated. With Copernicus it was scarcely more than a theory, and he uttered it with diffidence, reasoned for it, often absurdly, and clung still to some of the worst features of the former attempts at a system of astronomy. But when Kepler applied his severe mathematical analysis to the question, step by step was mounted, till he stood on that commanding height where he could defy all dispute. A proud moment was that when he demonstrated the last

of his three great laws. "Nothing holds me," he says, "I will indulge my sacred fury. If you forgive me, I rejoice: if you are angry, I can bear it. The die is cast. The book is written, to be read either now or by posterity, I care not which. It may well wait a century for a reader, since God has waited six thousand years for an observer."*

The planets, all sought out and counted, number eight;† besides which, several of these are attended each by one satellite or more than one; and there is a family of nearly two hundred little planets known as asteroids, forming a group by themselves. The full-grown children of our sun, however, are eight in number, six sons and two daughters. Their names are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. The family of asteroids have their names also, and a home between the orbits of Mars and Jupiter; but they need not here be mentioned further.

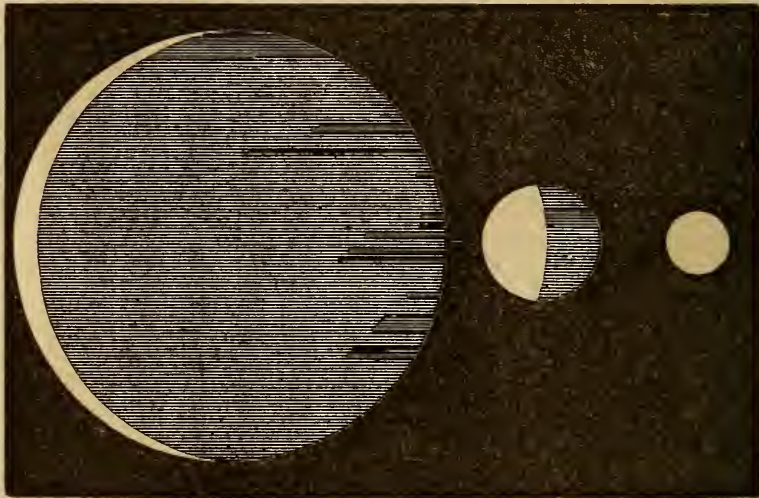
Mercury is supposed to be the planet nearest the sun. If there be one nearer, it has not yet been discovered; and Mercury stands off from the great central orb about 37,000,000 miles. Then comes Venus, which is about 66,000,000 miles from the sun, and which we recognize alternately as the morning and the evening star. This planet, viewed through a good telescope, shows all the changes that we recognize in our moon. When it is on the side of the sun nearest us, it shows as a faint crescent. When it is opposite, it is shaped like the full moon. In the one case this planet is only 25,000,000 miles from

* Mitchell's "Planetary and Stellar Worlds," page 98.

† A ninth planet, called Vulcan, is supposed to exist, very close to the sun; but the case has not been settled at this writing.

us, and in the other 157,000,000. The changes of the planet in apparent form, however, so balance these distances as to give it a brightness at all times very nearly the same.

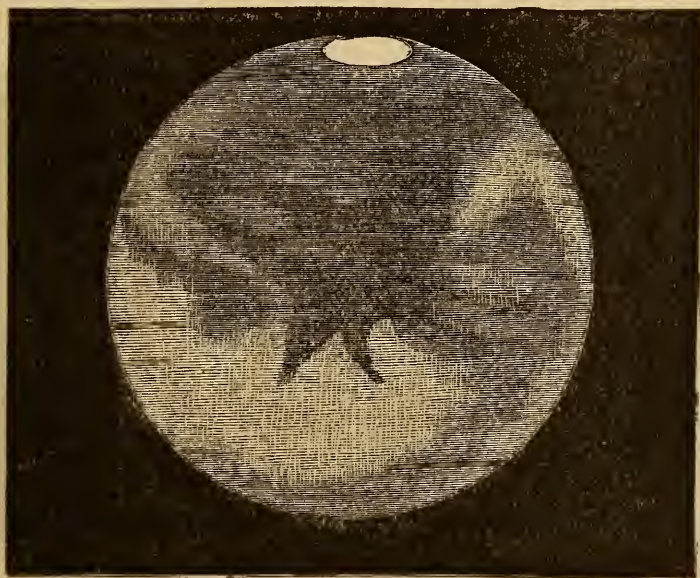
Next after Venus comes our own planet, the Earth. Then comes Mars, our next-door neighbor beyond. Mars, Venus and Mercury are all smaller worlds than ours; the other planets are much greater. The average distance of Mars from us is about 50,000,000 miles; but sometimes



DIFFERENT PHASES OF VENUS.

he is not much more than half so far away; and he is more like our world than is any other planet in the solar system. We can see in Mars, as in our own world, a division of land and water; but in Mars the water-surface is less than the land. His inclination, or *tipping*, is also much the same as ours, being 29 degrees to our 23, and so he has the same changes of seasons as we do. Seen through a good telescope he shows a white spot at each of

the poles, which enlarges in his winters, and partly disappears during his summers, and so is thought to be ice and snow. The light part of the drawing in the accompanying figure is land ; the dark is water. On the whole, so far as we can judge, an inhabitant of this world might be transferred to the planet Mars, and feel quite at home. But this can not be said of any other planet in the system.



MARS.

Passing over the family of the asteroids, some of which according to Lockyer are not larger than "a good Scotch estate," we next come to Jupiter. This is an enormous world, and with its four satellites it constitutes almost a solar system of itself. Its bulk is 1,300 times greater than that of our globe ; and this accounts for it, perhaps, that though it was born long before our planet, it lingers yet in those geological stages through which our world passed so long ago. It is a world only partly condensed

yet ; for though it is 1,300 times larger than our globe it is only 300 times heavier, showing that its density is less than one-quarter that of the earth. Its inclination also is very small, so that there are no changes of seasons there ; and it is marked by numerous dark belts, which are continually changing, as if bridges of bright cloud were being thrown over the dark spaces. It is also very much flattened at the poles, and may be in part in a molten condi-



SATURN.

tion. It is not likely that we should very well enjoy a home on that grand great world. It is not finished yet.

Next comes Saturn with his golden crown and his eight satellites. No other planet in the system is so well calculated to attract attention as this. Its rings are three in number ; the outer two being quite bright, while the inner one, known as the "crape ring," is only just visible in a large telescope, the ball of the planet being seen through it. These rings are always nearly edgewise toward us, and are

so thin that in certain positions of the planet they can scarcely be seen. Saturn has much the same constitution as Jupiter, and like that planet is still in an early geological stage. Its axis is inclined about 26 degrees, and when it becomes a habitable world it will have much the same seasons as the earth does now.

After Saturn comes Uranus, 1,753,000,000 miles from the sun. It is a planet with a diameter about four times as great as that of the earth, but its density is only about one-fifth as great; and it is known to have four moons. Next comes Neptune, 2,746,000,000 miles from the sun, with a diameter a little greater than that of Uranus, and a density a little less. Beyond this, it is not probable that any other planet will be found. The distance from Neptune to the sun seems very great. A rail train running at the rate of 30 miles an hour, night and day, without stops for wood or water, would accomplish the journey in about 20,000 years. But this, as measured by the distance of the nearest fixed star, is very little. There is no fixed star nearer to us than about 7,000 times the distance of Neptune.

Our own world occupies a kind of middle place in the solar system, being neither so near the sun as to be scorched by his heat, nor yet so remote as to be beyond the influence of his kindly beaming. It has also reached a kind of middle epoch in its geological history, being neither an unfinished world like Jupiter, nor a dead world like the moon. As the temperate zones of our planet are the chief seat of human life and of Christian civilization, so is our world set in that middle place in the system where it can support the best kind of life, and so has it reached

that middle epoch in its geological history most favorable to the successful working out of the problem of our humanity, and the deeper problem of salvation through our Lord Jesus Christ.

A good deal has been said, at one time and another, about the probable populousness of the planets. But, so far as we can judge, with the possible exception of Mars, no planet but our own is in a condition to sustain life. Mars may possibly have such life as the earth exhibited about the time of the Tertiary Epoch, and the moon may have passed a brief life stage, some ages ago; but we have no reason to believe that the other planets are at present the abode of intelligent, sentient beings. True, we can say that God is not limited in his creative power, and so we can say that though the other planets are so unlike our own, he may have created a kind of beings who can have their home there; but when we go so far as that, we may as well suppose that he has created beings to live where there are no worlds at all. In this matter we must reason, if at all, by analogy. Between those other worlds and our own there is a strong resemblance. They are composed of the same chemical substances. They obey the same general laws. They are working out the same geological history. And, as most of them are in that condition where life was impossible for our own world, we naturally judge that life is impossible with them. Some of them are dark worlds—very remote from the sun. Some of them are terribly bright worlds, covered with a glare that must be as blinding as darkness itself. Some of them are dead worlds, frozen worlds. But the chief of them are unfinished worlds, reeking yet with heavy vapors,

and too intensely heated to consolidate into healthful land and water. Uses for those worlds there will be, by and by, no doubt, even as now for our own. For the present, however, their chief service is one on behalf of this little planet, and of its lowly and immortal creature, man.

CHAPTER XXXV.

THE FIXED STARS.

IN strict astronomical speech no planet is ever called a star. So, what has been said of those apparently vagrant bodies belongs properly to another department of this general subject. We have given it mention, because it has the notice of the sacred writer. He was not framing a scientific treatise, but a popular narrative, and so he included the planets among the stars.

We now come to that other class of the celestial bodies, which more properly receive this name. We notice that they maintain apparently the same relative distances both from ourselves and from one another, and so we call them the fixed stars. We shall find, by and by, some reason to doubt whether they are so firmly *fixed* as they seem; but, owing to their great distance from us, their variations are slight and slow, and so they are put in a class by themselves. They have other peculiarities also. Scientific men have learned to distinguish reflected light from direct radiation; and it has been found that while all the planets shine by reflected light, these stars emit a light of their own. This is one of the distinguishing qualities of our sun. It is self-luminous. The moon shines only because the sun shines upon it; but the sun shines with a

light of its own. It is in that respect like the fixed stars. Indeed, it is a fixed star; and being much nearer to us than any other star, we can discover by it what a fixed star is.

The sun is much larger than any one of the planets. Indeed, it is five hundred times larger than all the combined planetary bodies in our system; and, so far as we have been able to measure them, all the fixed stars are large, like our sun. Some of them are many times larger than he. There is a star known as Alpha Centauri, which is about twice as large. Sirius gives as much light as sixty-three such suns as ours. Capella is equal to 430 such suns. Arcturus is equivalent to 516. And Alcyone, in the constellation Pleiades, though not exactly measured yet, is reckoned by Dr. Burr, in his "*Ecce Cœlum*," to shine with the light of 12,000 suns! We call our sun a king; and sometimes we say how modestly the little stars retire before him when he comes forth from his eastern chambers to shine upon the world. But he is not a very great king, after all; and is but one among a thousand like him. In one respect, however, he shows himself possessed of kingly quality. Kings govern not by power alone, but by keeping up appearances; and when those "little stars" seem so modestly retiring from the presence of this august monarch, it is only a little kingcraft on his part, blinding our vision by his blazing presence, so that we cannot see them.

The number of the fixed stars is very great. Standing at the equator, on a clear night, one sees with the naked eye about 3,000. This for one hemisphere: for both we should have about 6,000. But the moment a telescope is

brought to bear upon the field, the number enlarges. A single patch of light in the Milky Way, not larger than the moon, unfolds under this closer scrutiny into a field packed with some thousands of these great suns. You cannot count them : they sweep too soon out from the field of vision. But the best estimate puts the number in that one little place at 50,000. Herschel held his glass for fifteen minutes toward one of these luminous places, and saw an army of not less than 100,000 of these brilliant things go by. Well, the Milky Way is all mottled with patches of light like these ; and, to the right of it and to the left of it, though in less profusion, these great suns are scattered broadcast like seed-wheat on the autumn fields. Inspiration has presented many thoughts of the greatness of God, but never anything greater than that word of the Psalmist : "He telleth the number of the stars : he calleth them all by their names." *

The distance of these bodies is even a greater wonder than their number. And the triumph of the human mind in measuring those distances indicates the marvelous nature of its powers. We thought it a great distance from the sun to the outermost planet of our system. Three thousand millions of miles outreaches our conceptions almost as much as infinity itself. But the nearest fixed star is not less than twenty millions of millions of miles away. Our long-measure unit, the mile, becomes almost useless in the reckoning ; and we have to resort to calculations made from the velocity of light.

It is not long since the velocity of light was ascertained. The discovery was made by the study of the eclipses of

* Ps. cxlvii. 4.

Jupiter's moons. Very accurate tables were constructed by which such eclipses were predicted, and it was found that in some cases the eclipse came on too soon, and in others too late, to match the figures in the tables. On further investigation it was found that the eclipses that occurred too soon were witnessed when that planet and our own were on the same side of the sun, and so comparatively close together. Corresponding to this it was found that the eclipses that occurred "behind time" happened when Jupiter was on the opposite side of the sun from us, and so at a great distance off. Roemer, a Danish astronomer, took up the study, and showed that this irregularity arose from the fact that light traveled through space with a measurable velocity. When Jupiter was on the side of the sun opposite our planet, he was of course the whole diameter of the earth's orbit farther from us than when he was on the same side with us. This diameter was proximately ascertained to be 190,000,000 miles; and the eclipses were apparently retarded about sixteen minutes when that distance was interposed. That is, it took the light about sixteen minutes to cross that interval. This was 12,000,000 miles a minute. This was 192,000 miles a second. Closer calculations have somewhat modified this conclusion, however, and at present the velocity of light is reckoned at about 185,000 miles for every second of time.

Proceeding upon this basis, M. Peters, after a profound calculation of the mean parallax of the stars of each magnitude, gives the following statement: "Stars of the first magnitude send their light to us in about seventeen years; those of the second magnitude in about thirty years;

those of the third magnitude in about forty-five years; those of the fourth magnitude in about sixty-five years; those of the fifth magnitude in ninety years; those of the sixth magnitude, the most remote visible to the naked eye, send us their light after a journey through space of one hundred and thirty years. While the distance of the lowest of telescopic stars visible in Herschel's twenty-foot reflector is such that their light does not reach the eye for 3,541 years after it starts on its tremendous journey." Of course these calculations are very general, and can only be taken as approximating the facts in the case; for a star of the third magnitude is not necessarily any more distant than one of the second, but may be simply a smaller sun. In a few instances, however, the parallax of a fixed star has been accurately determined; and we are able to state beyond reasonable doubt that light, which shoots at the amazing velocity of 185,000 miles in one second of time, is three years in passing from the nearest fixed star to our world!

As our sun has a retinue of planets, so it has been supposed that each of these other suns also is made to light and warm a system of worlds that circle round it. Analogy suggests this; but while there is a general analogy among the heavenly bodies, there is by no means perfect uniformity. God loves variety; and in the sphere of the starry heavens he has made no two things precisely alike. Thus, in our solar system it might be assumed, if we knew only the planet Jupiter, that as he had four satellites each other planet would also have satellites less or more. But such proves not to be the case. So with our sun. The planets are its satellites; and we have found eight of them. But

that does not prove that the next sun has satellites, or the next, or the next. So when the conjecture is made that each fixed star is the centre of a solar system, we must understand it to be a conjecture only; and when to this conjecture is added another, often made, that each planet in each of these myriad systems is the abode of life, we must understand that this is a still remoter conjecture; and when it is further supposed that such life is crowned, as is the case in our world, by intelligence and immortality, conjecture is piled upon conjecture till we have lost all solid footing. And yet Dr. Chalmers, in his "Astronomical Discourses," is at the pains to answer an objection against the Christian religion, based upon heaped-up conjectures of just this sort. "How can it be, that with such a mighty population in the universe, God should send his Son to die for this insignificant race of ours?" Mighty population? indeed, if we admit your conjectures, so it is; but it is sufficient to say that it will be time enough to answer your objection after your conjectures have been confirmed. At present, all we know on the subject is, that just here is a race of immortal beings, and that for their redemption God gave up his only-begotten Son.

CHAPTER XXXVI.

THE STAR-SYSTEMS.

AN apparent grouping of the stars is perceptible even to the most ordinary observer ; and from the earliest ages men have been accustomed to notice particular constellations and to give them names. Thus we have a belt of such groups, extending entirely around the visible heavens, through which the sun seems to pass in his annual journey, known as the constellations of the zodiac ; while both north and south of this belt the sky is mapped off into other constellations, to each of which a name has also been given. This process of naming the stars is carried even further ; for each star in each constellation has a name. Beginning with the brightest, which is always marked by the first letter in the Greek alphabet (the letter Alpha), the second brightest is named by the second letter, Beta, and the third by the third letter, until the alphabet is exhausted, when the numbers, 1, 2, 3 and so on are used. Thus Alpha Lyrae means the brightest star in the constellation Lyra, or the Harp, and Beta Cygni represents the second brightest star in the constellation Cygnus, or the Swan. Special names are also applied to particular stars, as Vega to Alpha Lyrae, and Sirius to Alpha Canis Majoris, and so on. By this system it is not difficult, so far as the

heavens visible to the naked eye are concerned, to call the stars by name.

The constellations thus marked, however, are grouped simply by appearance. Their apparent proximity, and the curious shapes they form, depend mostly upon the direction from which we see them. And to find real groups of stars, groups that have a manifest physical relation star to star, is quite another thing. Such groups are discoverable, however; and they constitute a study of the deepest interest to every man who would understand the wondrous works of God. Thus we have what are known as multiple stars. These go round each other, or round a centre common to them all. The motion of one of these stars round another is much like the motion of the earth round the sun; only, while the earth makes its orbit in a year, the shortest known revolution of one of these stars in its orbit is thirty-six years. These multiple stars are quite numerous. No less than 800 systems of the kind have already been discovered, and the number is increasing as astronomers pursue their researches. Generally, but not always, such a group appears at first glance as a single star. The telescope shows it usually as one large star with a smaller one revolving around it. But such systems often embrace not only two stars each, but three or more. In the constellation Pleiades not less than fourteen stars are found revolving round a common centre.

Besides these multiple stars, we have what are known as star-clusters. A few of these are visible to the naked eye, forming each a little white patch on the sky, like a small fragment from the Milky Way; and some of these, when looked at through a telescope, are seen to be closely

packed groups of stars, forming together a kind of system. There is a beautiful cluster of this sort in the constellation Hercules. It was discovered by Halley, as far back as 1714, and was not at first known to be composed of stars. It was a white patch in the sky; of what nature no one could say. But modern instruments have revealed



CLUSTER IN HERCULES.

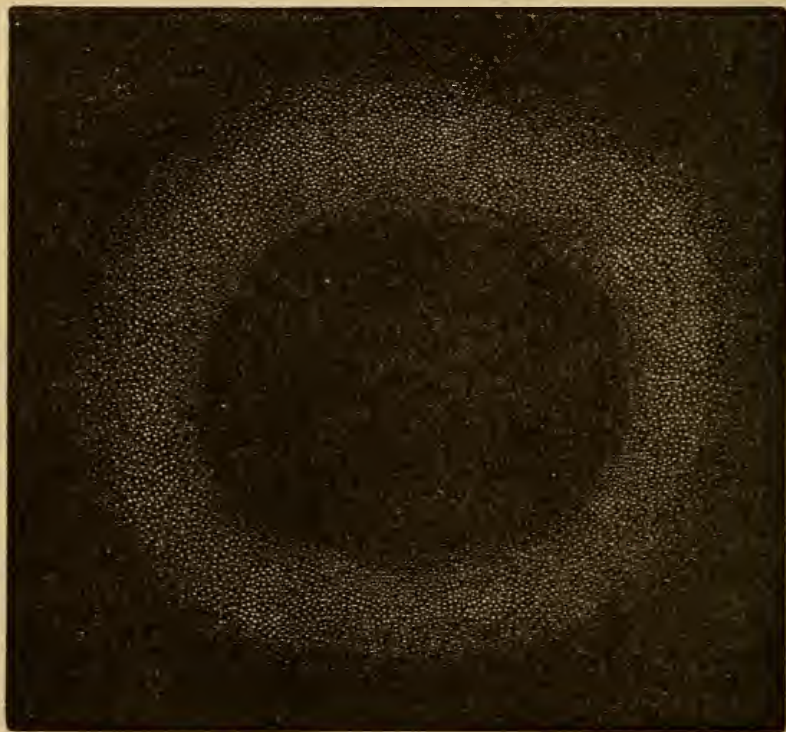
its true character. Professor Mitchell calls it an "Island-Universe;" and supposes it not inferior in extent to our Milky Way. He adds, "No one can behold this magnificent object for the first time without exclamations of wonder." Another of these magnificent objects is known as the Southern Cluster, and was resolved by Sir John

Herschel during his explorations in the south. Its position is such as to render it invisible in our latitude. Herschel regarded it as a globular cluster, and one of vast extent. He also observed a marked difference in the color of the central portions and exterior stars: the interior being of rose color, while the exterior is pure white. These varieties of color are far more vividly represented in the southern hemisphere than in the north. Yet they are visible everywhere, particularly in the binary systems.

Besides these star-clusters, we have a class of white sky-patches which no telescope has yet resolved. And to some of these the new instrument, the spectroscope, has been applied with such success as to show that they are of a nature entirely different from stars, or collections of stars. Their cloud-like appearance has given them the name of *nebulæ*. One of these *nebulæ* is found in the constellation Lyra, and is known as the ring nebula. "It appears," says Professor Mitchell, "as a ring of misty light, hung in the heavens, with a diameter as large as the moon when seen by the naked eye." It is not supposed that this is a true nebula,—though as yet it has not been resolved,—but rather that it is a vast congeries of stars united in one grand system. The object is so remote as to be quite invisible to the naked eye, and it is estimated that its light could not reach us in less than twenty or thirty thousand years.

It is proper in this connection to notice also certain objects known as *nebulous stars*. These are not clusters or systems, but single stars, each of which seems surrounded by a kind of fog. "It was an object of this sort," says Professor Mitchell, "which first suggested to Sir W.

Herschel his great theory of the formation of suns out of a nebulous fluid. He thought it impossible to account for the central location of stars, surrounded by nebulous matter, in any way except by supposing this to be a sort of atmosphere attracted to and sustained in its spherical form by the power of the central body. Specimens are



RING NEBULA.

found in which there is a mere condensation of light at the centre ; others in which this central light is brighter ; and so up to a perfect star with a surrounding haze. In some instances the star is found with a stream of light issuing from it like the tail of a comet. These are certainly objects of very difficult explanation, if we abandon

the idea of nebulous matter." These nebulous stars represent to us, perhaps, the process, and its various stages, by which our solar system was formed. A nebula kept growing smaller and rounder, till at the centre, where the pressure was greatest, there began to appear a star. The whole mass was whirling round this centre, very rapidly, and as it grew smaller it threw off a ring of vapor like the ring around the planet Saturn. This ring after a while broke, and formed a globular mass of vapor which by and by formed a planet. Then there was another ring,



NEBULOUS STAR.

and another planet, the star or sun at the centre growing all the time brighter and hotter; and this process continued until there was finished a solar system.

This was one kind of nebula. The other kind was vaster. Great islands of nebulous matter were planted in space; and were put under physical law, when at once they began condensing into stars and systems. The ring nebula in Lyra is such an island; the star-cluster in Hercules is such an island; and our own Milky Way is such

an island. Our sun is a single star of the Milky Way; the entire star-cluster being apparently arranged in disk form, like a great mill-stone. There is a split in one edge of the mill-stone; and our sun lies near that opening.

How many of these star-islands, incipient or completed, there may be, distributed through infinite space, we can only conjecture. The one of which our own solar system forms a part is sufficient to fill our conceptions of a universe; for the suns it reveals even in a very small space of open sky, where they stand thickest, have to be counted by millions. But others like it loom up in the vast horizon, as the adventurous navigator turns his prow outward and attempts to explore those unknown seas. Islands, we call them; but each island is a vast pebble-bank, and each pebble is a mighty sun. We begin with the binary system and multiple stars; and we end with the star-clusters and the greater nebulæ; but whether we have more than barely begun the exploration of the material universe, is more than man can say. "Great and marvelous are thy works, Lord God Almighty! Who shall not fear before thee, and magnify thy name?"

One of the things which the Bible impresses upon us, in regard to our Creator, is his immensity: what else can be thought of him when we see, as we now do, how he has planted these island universes, one beyond another, and kindled these great sun-fires to send their wavelets surging through the luminiferous ether? Another thing which the Bible affirms in very strong terms is the power of God; and how wondrously is his power manifested, in calling this material framework of the heavens into existence, and urging on its tremendous mechanism with

such exactitude from age to age! If there be such a God as the Bible describes, and if he shall execute a work of creation, are not these the proportions on which we may expect it to be laid out, and is not this the kind of workmanship we might expect to find? Do we not see in the celestial mechanics a kind of imperial fitness of things? Do we not find here a breadth, a profusion, a boundlessness, that leads well out toward the infinite? And is not this whole work very much what one would expect from an omnipotent and everywhere-present God? If the doctrine of a God be true, this material creation, these starry heavens, these towering systems of suns, and sun-clusters, and star-nebulæ, and island universes, established on spaces so immense, are very much the thing to match the doctrine and to confirm our faith in it. And, if any man can look out upon what has been passing before us, as we have taken this look among the stars, and say, "All this came by chance," it will be sufficient to reply, "Then perhaps even a God might have come by chance also."

CHAPTER XXXVII.

THE FIFTH DAY.

EACH step we take in this history lifts us into a higher range. We found the earth at first in a chaotic condition; but gradually it has been assuming order. We found it dark; but the light has come in. We found it without an open atmosphere; but God divided the waters from the waters. We saw the continents slowly rising out of the sea. We saw vegetation springing up, and at last massing itself into beds of coal. And, last of all, we saw the open sky, in which sun, moon, and stars were beaming. One thing at a time is God's method; but matters are advancing; and by and by we shall see this planet made ready for the coming in of such a being as Man.

To begin this fifth day, we go back again. The dry land has begun to appear, but it lies low and marshy. Vegetation has sprung up, but it is vegetation of an inferior order, consisting mainly if not entirely, as yet, of certain sorts of sea-weed. And though sun and stars have appeared, they shine upon a world in which there is not so much as a worm to crawl in the damp soil, or a jelly-fish to spawn in the tepid waters. Vegetable life

has made a beginning; close upon that God brings the dawning of animal existence. "And God said, Let the waters bring forth abundantly, the moving creature that hath life, and fowl that may fly above the earth in the open firmament of heaven."

The thing first called for was the "moving creature." The Hebrew word is *sheretz*; and Dr. Murphy says that means the "crawler," and that it "includes all creatures that have short legs, or no legs, and so are unable to raise themselves above the soil." He adds that "the aquatic and most amphibious animals come under this head." Principal Dawson, however, gives the term quite another meaning, and says that it refers not to their locomotion, but to their fecundity. It is not intended, as he supposes, to state by what means or in what manner these earliest forms of animal life moved about, but how rapidly they multiplied. Professor Tayler Lewis says that "the use of this term in other passages, and its connections here, force us to give it the sense of prolific breeding." And Professor Bush, who derives the term from the verb *sharatz*, "to bring forth, increase, or multiply abundantly," calls attention to the fact that it is the same used when the rapid increase of the children of Israel in Egypt is spoken of, and also where the plague of the frogs is described, which "the river brought forth abundantly."* We shall not go far astray, therefore, if we say that what God called for at first, in the animal creation, was a "rapidly multiplying creature." Very likely, also, these may have been "crawlers," according to the view of Dr. Murphy.

* Ex. i. 7; viii. 3.

The form of life next noticed was "fowl." This is our translation; but the term used by Moses was "flying thing." The spawning creatures and the flying creatures: so runs the account; both produced by the waters, both appearing on the same day, and the two curiously associated in the story. Were this story one of human construction, the creation of the flying thing would most likely have been left out of reckoning until the land animals had appeared; for "flying thing" with us means only fowl or bird, and these would have been considered part of the work of the sixth day. But this account brings in the creation of the flying thing with the aquatic tribes and the amphibia. This may occasion great difficulty in our minds, but so it stands in the story.

The twenty-first verse is in part a resumé of the things already stated. Moses makes his statement a second time, for the sake of bringing in an additional particular or two. It was not alone the spawning creature and the flying thing which the waters generated; but certain creatures of enormous growth. The spawners were generally small; but "God created great whales, and every living creature, which the waters brought forth abundantly after their kind, and every winged fowl after his kind; and God saw that it was good." The additional information given in this verse relates chiefly to the great whales; but we are not to suppose that these creatures were whales in the strict sense of that term. The word is *tanninim*, and might be rendered "the long creature." Our translators, wishing for a definite term, however, and regarding the whale as the creature of greatest bulk in the seas, thought that whales must have been intended, and ren-

dered the term accordingly. Dr. Murphy says that the term is one "embracing vast fishes, serpents, dragons, crocodiles." Professor Bush says that the phrase "great reptiles" would give the meaning. We shall not go far astray, therefore, if we say that besides those early spawning creatures noticed in the twentieth verse, the writer intends to make mention of a reptilian creation, particularly of certain creatures in such a genus, that bulked on his vision in enormous size. It will also be observed that in mentioning these creatures he speaks of the flying creatures a second time, as if to say that it was with this reptilian nature particularly that bird-life, or at least winged-life, was to be associated.

We must next notice particularly the element in which this new creation first manifested itself. This was "the waters;" and the waters of this early stage in the history of our planet were chiefly the waters of the sea.* There was no such uplifting of the land yet as to create large rivers, nor were there yet any lakes of any great size. The continents were slowly forming. Long lagoons, wide marshes, and warm shallows prevailed. In such a state of things the conditions of a low order of animal life were easy; and here, accordingly, it first appeared. This is the story, as given by Moses. Animal life is first of a low order, such as spawns abundantly and is of marine origin. Succeeding this, life-forms appear of larger bulk, still either marine or amphibious, and along with this, also in great abundance, the winged life culminating in the birds.

It also concerns us deeply here to notice the exact

* See Genesis i. 10.

terms in which the production of animal life is stated. We have two such terms. It was "created," and it was "brought forth." The introduction of the word *bara*, to create, in this place, can scarcely fail to attract attention; for it has not been once used in this account since the original announcement that "God created the heavens and the earth." Animal life, so far as we can judge, no more requires a distinctively creative act than vegetable life; and yet, when vegetable life appears, the word *bara* is not uttered. One thing, however, we notice, viz., that the creating and the bringing forth are the same thing; so that, in the estimation of the sacred writer, it would by no means be denying the doctrine of creation to affirm that a thing appeared as a development. "There was an exact moment," says Professor Lewis, "when animal life began—a life which before was not in our earth, and which, but for the Divine Word, saying, *Let it be*, most assuredly never would have been. The earth, or nature in her largest sense, through any power previously belonging to them, never would have originated or developed or brought it into existence. But still it does say, most distinctly, the earth brought them forth or gave them birth. The prolific water was the natural bed in which, through the vivifying agency of the Ruah Elohim, or Divine Spirit, originated the first 'moving things.'"

The life principle was a creation, and yet those early spawners were true children of the sea. The waters "spawned them," as the creatures spawned their successors: God having so charged those mighty seas with this new force of animal vitality, that everywhere, the conditions being favorable, the spawners began to appear.

After them came the great tanninim, and the birds. Life was there, and it took on a great variety of forms. It began low ; but it rose into superior orders, and God saw that it was good.

CHAPTER XXXVIII.

THE RESPONSE OF NATURE: THE DAWNING.

WE have seen what the Bible says in regard to the origin of animal life: what has Science to respond to those statements? Is its voice in conflict with that of inspiration, or are the two the same? Strictly speaking, we might say that Science has no voice to utter here; for, in the present state of learning certainly, no science can tell us how life first came in upon our globe. We can indeed trace the history of life backward, *toward* a beginning, and can reach a point which shows us the earliest form of life yet known. But whether something earlier may not have existed, the record of which has been entirely obliterated, or something the record of which is yet to appear, we do not know. If we are to have any exact and perfect knowledge on this subject, it must come to us from some other quarter. Science cannot tell us either how or when life began in our world.

Nevertheless, it can tell us something more or less bearing upon this great question, which we may find it interesting to know. For example, it can tell us, and does so affirm, that animal life appeared first on our globe in the marine form. It was not the kind of life that exists

on dry land, but that which is found in the waters, and especially in the waters of the sea.

The earliest records of such life that we have in nature are found in the lower stratified rocks. Certain organic remains are found in such rocks, representing to some extent the animal life that existed when those rocks were being formed. The rocks themselves consist largely of sediment, deposited at the bottom of some sea; and in such sea certain animals lived, which sank into the sediment at the bottom, and thus their forms were preserved. The sediment in process of time became rock. At a later stage the rock was uplifted, and formed dry land. And now we break the rock and find the fossil remains. Professor Dana* lays it down as one of the general principles bearing on the facts of what is called Paleozoic history, that "the earlier species were aquatic, and all of them marine. Protozoans, radiates, mollusks and water-articulates comprise all the known species of animals." This is high authority; and the statement exactly agrees with the account as given by Moses.

How did Moses know this? None of the schools of his age had learned it. There was not a man on earth in his day that would have known what a fossil was, had one been shown him. No one knew how the rocks were formed or which was oldest. Nearly everything known concerning fossil remains has been learned within the last half-century; and even now, much more than half the world is entirely ignorant on this subject. Yet, somehow, that marvelous man Moses was able to make the statement that the earliest animal life in our planet was in and

* "Manual of Geology," page 382.

of the sea. There is but one way to account for this. He was a man who was taught of God.

Another doctrine of modern science that corresponds to the teaching of this book here is, that all the earlier forms of marine life were of an exceedingly low order. "It was life without a voice, without a footstep, without a wing," says Professor Winchell. And Professor Dana * says, "The earliest representatives of animal life on the earth had no special organs, either of sense; of motion, excepting minute hairs or hairlike processes; or of nutrition, beyond at best a mouth and a stomach." It was life in its simplest or most elemental condition. One species of these earlier creatures he describes as of even simpler structure still, "having generally no mouth or stomach," but "extemporizing each, when a particle of food touches it," by depressing its soft surface at the point of contact, and closing over the particle till digestion has been performed. Principal Dawson thinks he has discovered the remains of one of these very early species in the Laurentian rocks. He calls it Eozoon; but it is of so utterly simple a structure that the question is in dispute among scientific men whether it should be reckoned with organic existence at all.

This quite agrees with the representations given by Moses. Those sea-spawners of his were unquestionably a low order of creature. Birds, reptiles, land animals, these all came later. At first it was the "moving creature" simply; or the "crawler," as Dr. Murphy would have it, or the "rapidly multiplying creature," or the "spawner," as the word literally signifies. As a rule, the

* "Manual of Geology," page 161.

lower orders of animal creation are amazingly fruitful. The mammalia, and especially such as approach anywhere near the human range, bring forth a single offspring once a year, or once in two years, or once in five years, it may be; but a fish spawns its thousands in a single season; and Poli has computed that a single oyster contains, in some cases, 1,200,000 eggs, all of which are spawned in one season. When, therefore, Moses marked those early creatures by their fecundity, he not only stated a fact, but he declared in effect a general principle—they belonged to the lower orders of the animal creation.

So Science comes round again to the record and responds, Amen. Nearly four thousand years ago Moses stated that the early types of animal life on our globe were all marine; and geology says, "It is so." Again, he says that all these types were very fruitful; and geology says, "I can show you whole systems of rock built up by their almost microscopic remains." Again, he says in effect that this early life was all of it of a low order—spawners, crawlers, sprawlers; and geology, by its noblest prophets, once more replies, "It was life without members, life without voice, or footstep, or wing."

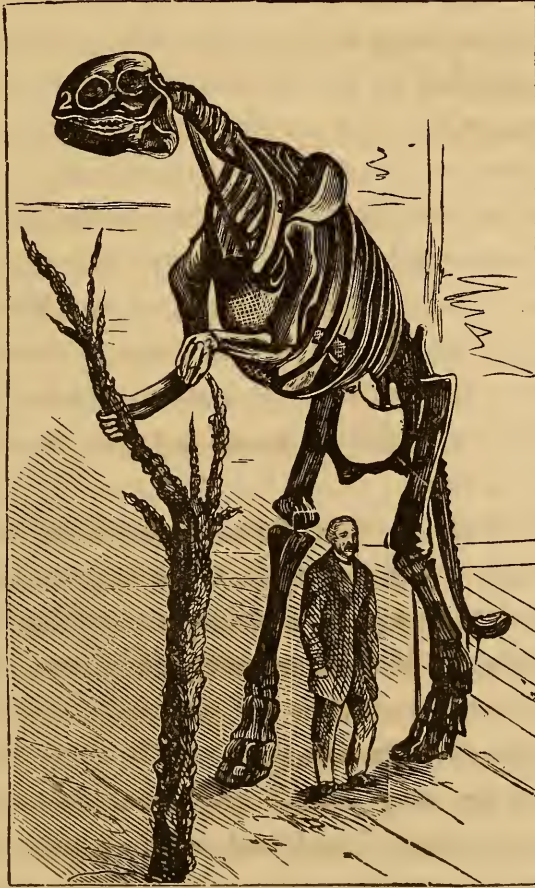
CHAPTER XXXIX.

THE REPTILES AND THE BIRDS.

THE living creatures came in successive dynasties. In the earlier empire, the ignoble family of the mollusks for a long time bore sway. At a later date came in a dynasty, cold-blooded, but at least possessing backbone. It was the fish family; and some of its members were great and powerful beings in their day. But clear above them towered a succeeding dynasty, reaching its greatest height in what is known as Mesozoic time, and marking it as the Reptilian Age. This age was introduced by the race of batrachians, of which our best and almost only remaining modern representative is the frog. These creatures come into life first as tadpoles, living only in the water, and breathing by means of gills, like a fish; but as they attain to maturity they become air-breathers, capable, however, of remaining a long time under water, where their skin does the work which their gills once performed. We call them amphibious, as living in either element indifferently. They are a kind of compromise between the fish and the true reptile, the latter being an air-breather exclusively, though not needing like the higher creatures what we should call very pure air. These batrachians were of immense size in some cases. One of them, walk-

ing on two feet, says Professor Dana, was "tall enough to look over a twelve-foot wall."

Of the true reptiles, the lizard species was very prominent. It is known by geologists as a saurian, and appears



HADROSAUR.

(From Winchell's "Sketches of Creation." New York: Harper & Bros.)

in numerous varieties. One of these was the enaliosaur, or swimming reptile, fifteen to forty feet long; and another was the mosasaur, or snake-like reptile, ten to seventy feet long. One of these creatures, of the dinosaur, or "terrible

lizard" family, was called the hadrosaur, and, says Professor Dana, was "full twenty-eight feet in length." Professor Winchell says, "The hadrosaur attained the length of thirty feet. It could stand erect, and used its fore feet to grasp the foliage of the trees, which served it for food." This must have been a "terrible lizard" indeed to look at, though as it fed on plants only it was not so dangerous as the laelaps, which was a carnivorous creature, and could also stand erect, measuring twenty-four feet.* Such were the forms of animal life which at one period in the history of creation prevailed on both the eastern and the western continents. It was the reptilian age; and the chief creatures that populated the world were of this character. They were "great whales," as our translators would say; or more properly, as Moses would say, they were tanninim, or long creatures.

If Moses took in this creative work by visions and glimpses, what could there be, more certain to arrest his attention, as the great procession passed by, than those gigantic reptiles? He had no name for them. Such terms as hadrosaur and mosasaur did not occur in the Hebrew language; but there was a verb which signified "to draw out" or "to be very long," and from this verb Moses made a noun, "tannin," and said, I will use that as a name. These creatures standing thirty feet high, these others swimming forty feet long, and these snakes measuring seventy feet and furnished with curious paddles, I will call the tanninim!

He did not call them whales. That was the mistake of the translators. They supposed that such long-drawn

* Dana, "Manual of Geology," page 464.

creatures, seen about the waters, must be whales, of course ; for they knew of nothing else extant that would match the term, and of fossils they had no knowledge at all. So, even with Moses' words to guide them, they blundered in the use of terms, while Moses himself, with nothing to guide him, unless we suppose that he was divinely directed, avoided their error, and chose the very word that was wanted.

One other thing deserves special notice here ; and that is the association of these reptiles with the family of the birds. Moses puts them together : does science allow this, or is it inadmissible ? To this it is to be answered, first, that the reptilian age is recognized as the age of birds by all good geologists. The period is that known as the Mesozoic, extending somewhat, however, into tertiary time ; and Principal Dawson* remarks that "reptiles and birds appear abundantly in the Mesozoic age." "Remarkable harmony of form characterized the higher terrestrial life" of this age, says Professor Dana. There were "dinosaurs that could raise themselves erect and march off like birds ; birds measuring height with the amphibians, and outreaching them by their longer necks."† One of the great reptiles of that age, the megalosaur, twenty-five or thirty feet long, presented a "curious analogy, if not some degree of affinity, with the ostrich." Reptiles appeared, having bones that were light and hollow, like those of birds ; and birds appeared, having pointed teeth in both jaws, like reptiles. One reptile, the pterodactyl, had wings, and could fly like a bird, while its head was also of

* "Bible and Nature," page 122.

—† "Manual of Geology," page 430.

bird-like form. This was a marvelous creature, and sometimes of enormous size. If Moses saw it in vision, it is not strange that he set down the words "flying thing." Specimens have been found which must have measured twenty-five feet from the tip of the one wing to the tip of the other. And there was a reptile known as the archæopteryx, with bat-like wings, which produced a row of quills on each side of its long tail! Indeed, so completely does this creature unite the bird-nature with that of the reptile that naturalists are undecided upon which side of the dividing line to place it. Generally it is spoken of as an ornithoid reptile; but Professor Dana classifies it as a herpetoid bird. Thus it appears that there is a curious connection between the reptile class and the bird class. They both populate the earth in the Mesozoic age, and their two natures blend in the most remarkable manner.

"Great whales and fowl that fly," reads our translation: the long-drawn creature and the flying creature, says Moses. He brings them into the same day's work, and sets them side by side; apparently confounding things the most diverse. Nothing could seem further apart than the reptilian nature and the bird nature; and yet he persists in associating them together. A perplexing matter this, till geology comes in with its marvelous revelations, when lo, all is plain. We gather up the fossils of the Mesozoic age, and there we find reptiles with bones, legs, wings, bills, quills, like birds; and birds with teeth in both jaws, like reptiles. They are enormous creatures, too, and such as to attract attention as the vision sweeps by. Moses sees them, and makes the record. For four thousand years it stands unconfirmed. It is the puzzle of interpreters, and

the stumbling-block of infidels. When lo, the rocks render up their secrets, and the whole story is told. Moses, by inspiration, declared, four thousand years ago, what science has been able to discover only in these later times. His declaration was not understood, indeed, till we found the key to it all in the study of geology ; but now it admits of no question. His account of the reptiles and the birds is like those prophecies which are in themselves obscure, but which wondrously harmonize with the event when it occurs. History is a sure interpreter of prophecy ; and geology, rightly read, is, as to certain parts of creative history, an equally sure interpreter of the Mosaic record.

CHAPTER XL.

THE SIXTH DAY: ITS MORNING.

THE sea has been set at work producing animal life: now let the land begin. "Let the earth bring forth the living creature after his kind, cattle and creeping thing and beast of the earth after his kind; and it was so." This is the inscription that stands across the gateway by which we move another stage downward among these creative days. Let us decipher the mystic sentences if we can, and penetrate the hidden wisdom which they cover.

This is the sixth day. We must not suppose, however, that the fifth day was completed before this began. This day gives us the creation of the land animals; but they did not wait to appear till all those great sea-forms and amphibia had had their time out. The new race of creatures commenced its existence, indeed, later than the previous race; and in like manner it reached its culmination later; but the two creations overlapped each other, and went on for a long time side by side. This is the method of this entire cosmogony, and by this interpretation alone is it that all is made plain.

On this sixth day "living creatures" were called for. They were brought forth by the earth instead of the sea,

and so we reckon them land animals. This phrase, living creature, is *nephesh hayah* in the Hebrew, and it may be well for us to acquaint ourselves with the term ; for we are likely to meet it again. In the second chapter of Genesis, at the seventh verse, this *nephesh hayah* means the immaterial part of man. God breathed into his nostrils the breath of life, and he became a *nephesh hayah*, living soul. So the term signifies a living soul ; and as Moses calls these beasts living souls, we are at liberty to suppose that he intends to assign to them a nature not material, as well as to man. He makes this distinction, however, between the two : the one kind of soul is earth-born, and the other is imparted by the inbreathing of the Almighty. The brute soul has one origin ; the human soul another. And as their origin is not the same, so may we infer that they are different both in nature and in destiny.

Some of these living creatures are called cattle. The term applies to herbivorous animals, and particularly to such as have been domesticated. " Let the earth bring forth the domestic animal," is the creative order ; and the record is that such animals were brought forth. They had not, indeed, been yet domesticated ; but they should be when man should appear. They were domestic animals in general appearance, and were called such by anticipation. If, as has been suggested, Moses drew these pictures from what he saw in a kind of vision, we may suppose that he beheld on the earth, as this sixth day was unfolded, those animals which were afterward domesticated ; or creatures so nearly resembling them, that he gave them the same general name. He saw these creatures

browsing the green pasture-ground, and he set down the word cattle.

He also mentions "beast of the earth after his kind." This probably means the wild beasts; especially the carnivorous animals. He does not describe these beasts particularly, or catalogue their names; there was no need of that, and, moreover, some of them might have been creatures he had never seen before, and for which he had no name. He observed their general character, however, as the strange vision swept by, and set them down "beasts of the earth."

One thing more he specifies—creeping thing. This term, like a great many others in this account, is descriptive rather than specific. So the writer designated the rapidly multiplying thing; so he named the flying thing; and so he took notice of the long-drawn thing. The Hebrew language contained no word to designate these creatures, and so Moses described them. It is the same with respect to these creeping things. He saw creatures which went low on the ground, perhaps creatures prowling* and crouching while seeking their prey, and he wrote down the term, "creeping thing."

The suggestion that there were "prowlers" in those days will startle some good people, because the opinion has been very extensively entertained that until man sinned and fell all animals were harmless, and that none of them preyed upon each other. But while the Bible teaches, indeed, that "death" entered the world by "sin," we judge that the death and the sin alike, in that case, are human. As for the harmlessness of the carnivora

* Dana, "Manual of Geology," page 768.

before the fall, we are probably indebted for that doctrine to Milton's "Paradise Lost:"

"About them frisking, played
All beasts of the earth, since wild, and of all chase
In wood or wilderness, forest or den.
Sporting the lion ramped; and in his paw
Dandled the kid. Bears, tigers, ounces, pards,
Gamboled before them."

So sang John Milton; but in the matters we are now discussing we are more concerned with the writings of another man. Moses is our present authority; and if we have rightly rendered his words he certainly indicates that not only before man sinned, but before he was created, there were carnivorous animals in the world.

As we move out into this sixth day we see once more that creation is advancing. That is, we are steadily coming up from a lower range of things to a higher; from a world without form to a world that is set in order; from a dark world to a world where there is light; from a world where the waters cover everything to a world whose continents are forming; from a world without an open atmosphere to a world encompassed with pure air; from a world in which there is no life to a world on which the grass begins to spring; and from a world in which life was only vegetable in its character to a world where, rank above rank, the animal creation appears. The earliest animal life, as we have seen, was of the sea; and it is a principle among naturalists that this "involves inferiority of species." Next came the amphibia, connecting sea and land, and then came the creatures that tenant the dry land only. The lower grades appear, the life they represent

reaches its maximum, and then there is generally a dwindling away ; but before the lower grade is gone, a grade higher begins. Its first dawnings are seen usually about the time the lower grade reaches its best state ; and, once started, it immediately begins to work toward better forms, still gaining upon the type of life below, until it marks the age in which it stands.

In the sixth day we are among the mammalian tribes. These cattle, creeping things, and beasts of the earth belong to that order. They are not only creatures that live on the land, and so the highest order of living thing to which we have yet come, but they are of that class in which we reckon the highest of all, the last formed creature, man.

CHAPTER XLI.

THE EARTH-PRODUCT : ITS PERIOD.

THIS sixth day's work occurs on dry land. That of the previous day was entirely marine. For that, the fiat went forth, "Let the waters germinate." For this it is, "Let the earth bring forth." And as there was a sea-product in the former case, so is there an earth-product in this. This is the second time the earth has been called upon to produce life, besides the special call that was made upon the sea. The first life-call was for vegetation: "Let the earth bring forth grass." In that case the word "earth," as in verse first, probably includes the whole globe without distinction of land and water; for vegetation appeared in response to that call both on the land and in the sea, the sea-forms coming first. But when animal life is called for there are two distinct fiats of the creative Will. The sea is first set at work; and then, by a second call, the same kind of life comes forth on dry land.

In what manner the earth responded to this call we do not know. A somewhat common notion is that by this call God created all sorts of animals under the soil, and that when it is said that the earth brought them forth, the meaning is that they worked their way up into the light

and the air. This again is the conception of John Milton; and it shows what a power his great epic has been in the world, that so many have accepted its poetic fancies for Scripture truth.

“The earth obey’d; and straight
Op’ning her fertile womb, teem’d at a birth
Innumerable living creatures, perfect forms,
Limb’d and full grown. Out of the ground up rose,
As from his laire, the wild beast, where he wonns
In forest wild, in thicket, brake, or den. . . .
The grassy clods now calv’d; now half appear’d
The tawny lion, pawing to get free
His hinder parts, then springs, as broke from bonds,
And, rampant, shakes his brinded mane; the ounce,
The libbard, and the tiger, as the mole,
Rising, the crumbled earth above them threw
In hillocks. The swift stag from under ground
Bore up his branching head; scarce from his mould
Behemoth, biggest born of earth, upheav’d
His vastness.”

So John Milton, but not Moses. With Moses, the earth is causative; with Milton, not. It is rather a hindering cause, and, we should judge, in one or two cases a hindrance of a pretty serious sort. Behemoth “scarce” gets out at all, and if the tawny lion had not pawed pretty vigorously, his “hinder parts” might have stuck fast to this day! And, if this was the way of it, what was the use of creating these things under-ground at all? But, if we suppose the earth, at God’s call, actually to have germinated some low form of living creature, and so to have started animal life, the conception agrees with the record. In such a case, the earth would make a response to the call; but, in the case conceived by the author of “Paradise Lost,” the earth only hinders, and helps not at all. Even as a poetic

figure, this conception of Milton is sufficiently gross, but to be adopted as a sober reality, it is much less Scriptural than Darwinism itself. If the earth "brought forth living creature," in the usual sense of those terms, there was a germination in the case; and if a germination, then why not, by God's will, all from a "few germs"? This notion of all creatures "limbed" and full-grown at first, and the attempt to accommodate it to the Scriptures by assuming that these creatures were created under ground, and burst up through the sod, is neither Bible nor philosophy.

Great account, however, is made by some interpreters of the phrase used here, "after his kind." God made "the beast of the earth, after his kind; and cattle, after their kind; and every creeping thing that creepeth upon the earth, after his kind." Yes, so reads the record; but does that mean that he created these things independently of second causes? Does that mean that he in no way summoned existing nature into the service? If so, why then does he issue the fiat which requires all this of the earth? He created these things in some way, we know not how, by means of the earth.

True, he created them of various kinds; but that neither proves that he created all sorts at one and the same instant, nor yet that he created any sort full-grown. For aught that is here affirmed, he may have created one kind from another, even as he did the first kinds from the earth. It is a false interpretation which insists that this passage teaches that each species in the animal kingdom is an original creation, and it is an interpretation which may yet prove very unfortunate for the friends of the Bible. Moses teaches no such thing. His whole account is gen-

eral. He says that God made these land animals in three "kinds": one "kind," cattle; another kind, "creeping thing;" and another kind, "beasts of the earth." Our scientific conceptions, expressed by the terms genera and species, were entirely foreign to his thought. God called to the earth, and the earth answered back in three general kinds. This is all that Moses affirms; and as long as we keep to this, we are at liberty to indulge any scientific hypothesis which the facts in the case may seem to require. If Mr. Darwin will admit as much as this, viz., that what nature produces comes by God's call, and that such call was not merely given at the beginning, but has been repeated at some rare intervals since, we can harmonize him with Moses most beautifully, and name his theory as he does, "the plan of creation." *

Professor Tayler Lewis says, "A development theory which has no divine origination, or acknowledges the going forth in time of no Divine Word, is indeed atheism. . . . But a development theory, in the sense of species from species, as well as individual from individual, may be as pious as any other. It may have as many Divine interpositions as any other. It may be regarded as a method of God's working, and that, too, as rationally and as reverently as the more limited system, to which we give the name of nature in its ordinary or more limited sense. Modern theologians have been too much frightened by certain assumptions and speculations on this field." Then referring to the doctrine of spontaneous generation, which goes even beyond Darwinism, he says, "It may well be doubted whether Mr. Cross ever produced insects

* "Origin of Species," page 427.

under the circumstances which he claims to have given birth to his famous *acari*, but there is no rational difficulty, and no impiety, in the supposition that the Divine Word, which first originated and gave law to animal life, may have connected its development with certain chemical conditions, which science may discover, as well as with the presence of a seed in certain states of air and heat." *

A combination of natural causes and divine interpositions—this is the Mosaic conception of creation. It is not nature working on irrespective of God; and no more is it God working on irrespective of nature. He originates the system, and in so doing sets in operation certain forces. These produce important results; but this is not all. Rarely indeed, but still clearly, at special epochs God "speaks;" and obedient nature answers by a nobler product than has appeared before. In the whole long history of the introduction of animal life upon our planet, and in the bringing forth of all its forms, as related by Moses, he "spake" but three times. Mr. Darwin might admit as much as that, one would say, and still claim for his development hypothesis a very wide range.

As to the period of this sixth day, we can only indicate it in general terms. No account is kept of years and centuries yet; but the æons succeed each other in an orderly arrangement. Chaos, light, an atmosphere, the continents, vegetation, sun and moon, marine life, life on the dry land—so they stand. We count by these stages, not by years; for though the great time-keepers have been set going, brutes do not mark time, and man has not yet appeared. All we get from Moses is the order of succes-

* "Six Days of Creation," page 215.

sion ; and following this order we have found ourselves in the midst of land-life, which also proves to be mammalian life, next after the reptilian epoch, and next before the coming in of man. If this arrangement of the record is false, science will show it ; for science can give us the general order of this creative work. But, if this arrangement is correct, as science distinctly declares it to be, then have we once more come upon an evidence of the divine inspiration of this writer of a most conclusive sort.

This is the more observable, because the writer separates this sixth day into two parts. It is like the third day in that respect : two creations occur. The day is all mammalian indeed ; for man belongs to that order in creation. Therefore, there is a kind of unity in it, making it one day instead of two. But the mammalian epoch, and the human, as Moses gives the account, are separated the one from the other. Man, though a mammal, comes in later, and is a being of another grade. Something occurs between his epoch and that of the mammal's, sharply separating the one from the other. We shall presently see what it was which made this separation : and afterwards, perhaps, why man is set alone in this great work ; but for the present, we have sufficiently indicated the period of this sixth day.

CHAPTER XLII.

NEOZOIC TIME.

THE creative progress of our globe with reference to life may be divided into four periods. 1. Archæan time, embracing the ages represented by those rocks which bear no life-signs, and those which bear the earliest life-signs; 2. Palæozoic time, covering the period represented by the Silurian, Devonian, and Carboniferous rocks; 3. Mesozoic time, which was the Reptilian age; and 4. Neozoic time, or the New Life period, covering what is known in geology as the Tertiary age, and the Quaternary. These divisions essentially are recognized by all geologists, though sometimes designated by different names. We may put them in tabular form.

- I. Archæan time, viz. :
 - 1. The Azoic age, and
 - 2. The Eozoic age.
- II. Paleozoic time, viz. :
 - 1. The age of invertebrates; or, the Silurian age.
 - 2. The age of fishes; or, the Devonian age.
 - 3. The age of the coal-plants: or, the Carboniferous age.
- III. Mesozoic time; or, the Reptilian age.
- IV. Neozoic time, embracing—
 - 1. The Tertiary age; or, age of mammals.
 - 2. The Quaternary age; or, the human period.

It will thus be seen that the sixth creative day stands in Neozoic time, and that its two divisions correspond very accurately with the two ages of that period as represented above. The former of these two divisions, viz., the Tertiary, is represented in the sacred narrative by the twenty-fourth and twenty-fifth verses of the first chapter of Genesis. These are the verses upon which we have been commenting in the last two chapters. This Tertiary period is the time indicated in God's call for and the earth's production of "cattle, creeping thing, and beast of the earth."

But we must here note a subdivision of this period. It has a three-fold unfolding. Its earliest part is known as Eocene time; its middle part is called the Miocene; and its subsequent part is called the Pliocene. The Eocene, the Miocene, and the Pliocene—these make up the Tertiary; and the last part of the Pliocene is sometimes called the Post-pliocene. This threefold period is it which Moses has before him, if all our previous discussions have not been at fault, when he speaks of the creation of those animals of the mammalian order, which he calls "cattle, creeping thing, and beast of the earth." Well, this corresponds exactly with the revelations of geology; for while the dawn of this mammalian epoch is to be recognized far back in the Reptilian age, the dawning was but faint there, and this Tertiary age witnessed its noonday. There were a few creatures of the mammalian kind in the Reptilian age, but they were those of a low order; while the Tertiary age is acknowledged as richer in mammalian life than any period before or afterward. Dr. Dawson *

* "Earth and Man," page 255.

says, "We regard the mammalian fauna of modern India as one of the noblest in the world; but it is paltry in comparison with that of the much more limited Miocene India, even if we suppose, contrary to all probability, that we know most of the animals of the latter. But if we consider the likelihood that we do not yet know a tenth of the Miocene animals, the contrast becomes vastly greater." If Moses had a vision of that creative epoch, how could he better distinguish it than as he has done, by describing it as an age of mammalian life?

There were some conditions favorable to such life at that time. One was, the almost even climate that prevailed everywhere. For as yet, those sharp divisions between the frigid, the temperate, and the torrid zones which are now recognized did not prevail. Life did not sort itself off as it is now obliged to do, according to latitudes, but distributed itself everywhere; so that remains of both animals and vegetables belonging to this age are found in arctic regions, which now could flourish only in the warmer zones. The earth-crust was not then so greatly cooled as now, and so did not so much depend upon the sun for heat. Moreover, it is not impossible, as has been shown by Professor Waring, in his "Miracle of To-day," that the present inclination of the earth's axis was much less then than now. At any rate, it is admitted that our planet, during most of the Tertiary age, was exempt from its present extremes of arctic weather.

We find in that age representatives of each of those three classes of creatures spoken of in the passage now before us. We do not find, indeed, that exact species of each kind which exists on the earth at the present day.

The *species* of the Tertiary age are nearly or quite extinct ; but we have much the same *genera* then as in these times. Thus we have the progenitors of our present domestic animals, or "cattle." The hog appears in the London clay of the Eocene period, and in the Miocene we have the camel, which to Moses was a very familiar domestic animal ; also the sheep and the ox, and not less than three species of the horse.* None of these were of exactly the same species we now have ; and the horse was particularly noticeable, one species of that day being no larger than a fox ; but there were true horses, sheep, oxen, hogs, and camels ; and though Moses had never seen any exactly of that sort, he recognized them, and very properly set down the term domestic animals, "cattle."

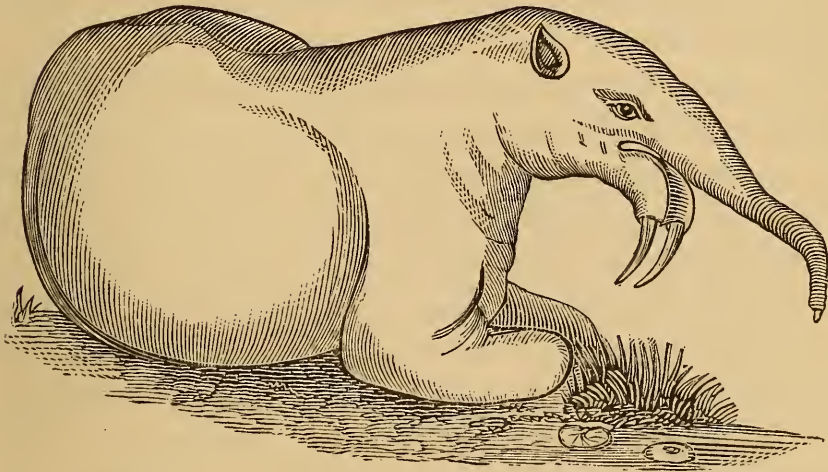
Of wild beasts there were plenty. The city of Paris is built upon an Eocene formation ; and the researches of Baron Cuvier in those beds brought to light most wonderful remains there. The sea in which these rocks were deposited seems to have become shallow after a while, and lakes or ponds and marshes of saltish water remained, like our American "salt-licks," which were resorted to by animals from all the surrounding country. These creatures were often mired in the muddy shores, and so lost their lives and left their bones there. Whole "herds of heavy, short-legged, and three-hoofed monsters (*palæotherium*) with large heads and long snouts, probably scantily covered with sleek hair, and closely resembling the modern tapirs of South America, laboriously waded through the mud, and grunted with indolent delight as they rolled themselves in the cool saline slime."† The stag was also

* Dawson, "Earth and Man, page 255.

† Dawson.

a tertiary animal, and so was the antelope, and the hippopotamus, and the rhinoceros, and the elephant, especially a great hog-like species of elephant known as the mastodon; and if there had been a Nimrod in that day he might have called our world the hunter's paradise.

There was one of the wild animals peculiar to that age which deserves special notice. It has been named the dinotherium, and is described as a strange mixture of the elephant, the rhinoceros, the tapir, and the marine man-



THE DINOTHERIUM.

tus or dugong.* The remains of this creature were found in the Miocene of Epplesheim, in Germany, and are described by Professor Kaup. Its "skull is three feet four inches in length; and when provided with its soft parts, including a snout or trunk in front, it must have been at least five or six feet long. Such a head, if it belonged to a quadruped of ordinary proportions, must represent an

* Dana.

animal as large in proportion to our elephant as an elephant to an ox."* Its most marked peculiarity was its tusks, which, proceeding downward at right angles from its lower jaw, constituted a kind of two-pronged pickax, with which it grubbed for roots, or tore up trees that it might feed upon the branches. If Moses had a vision of the animal creation of that day, this monstrous dinotherrium must have attracted his attention; and if he saw it, floating its huge bulk upon the steaming waters, or tearing through the forests and throwing up the soil, it is not any wonder that he marked one thing at least as a "beast of the earth."

There were carnivorous creatures also in great abundance, and among these was one which stands prominent as a creeping thing, or prowler. It is found, as stated by Dr. Dawson, in the European Miocene, and is named the *machairodus*. It belongs with the cat family, but has all the terrible features of that race exaggerated. Its fangs, for example, were like a pair of sabres extending downward from its upper jaw; and it could spring upon the biggest pachyderm of that age, a rhinoceros, an elephant, or even a dinotherrium, and strike in those monstrous teeth, and hold its grip, and suck the creature's blood, until it brought him down. If Moses saw the carnivora of that day, in vision, this terrible tiger-cat must have arrested his attention. And if he marked its characteristic movements, it is not strange that he wrote, "a prowler!"

So there is no great difficulty in identifying this first work of the sixth day with the Tertiary period of Neozoic time. After the great whales and the birds, says Moses,

* Dawson.

came the cattle, the beast, and the creeping thing. And science answers, "After the reptile age came the mammalian age." The record in the Book has been open for three thousand years, but has not been well understood. It is being illustrated in our day by a series of stone pictures; and the new-found pictures strangely match the old printed story. Lithograph and letter-press—let us study them together.

CHAPTER XLIII.

A PAUSE IN CREATION : THE ICE-AGE.

THE work of the sixth day was two-fold : it embraced the creation of the mammalia and the creation of man. The first part of this work is recorded in the twenty-fourth and twenty-fifth verses of the first chapter of Genesis ; the latter begins with the twenty-sixth verse, and is much enlarged upon. The former winds up with the usual formula for a finished day's work, "And God saw that it was good ;" the latter opens very much as if a new day's work were being inaugurated. The two parts of this one creative day thus stand separate. There is a sharply-defined division line between them. This division naturally indicates a pause in creation, and more than hints that just there the process was arrested, after which it began again.

Are we able, then, to find anything in creative history, as read from the rocks, which locates such a pause and confirms its reality ? Does geology indicate any such period separating the mammalian epoch from the human, in which the progress of creation was arrested, and when no new species of either animal or vegetable life appeared ? The answer to this question is close at hand. It was just at this point that the great ice-age came in ; and that age

not only arrested for the time being all creative energy, but threatened to reduce our planet to its original chaos. To understand this peculiar epoch, we need to notice a little what is known as glacial action.

A glacier is a river of solid ice, from two hundred to five thousand feet deep, having its rise in some mountain region, among the heights where there is perpetual snow, and slowly making its way downward to the lower levels. Where a region lies above the line of perpetual freezing, and where also there is a moist atmosphere, the snow continually accumulates and must somehow be disposed of. A part of it, more than is usually supposed, disappears by evaporation; but the most of it must somehow be sent down from the mountain-tops to be melted in the region below. Some of this is blown down in wild flurries, the terrible winds of those upper regions whirling it to vast distances, where it melts and falls in mists and rain. In other cases, especially if the mountain-side is steep, it breaks away in huge masses, and is launched with irresistible force from the declivity, and we have an avalanche. But at other times it is compacted together more closely, and moves more slowly, taking the course of some valley, and then we have a glacier. It has been proved by experiment that snow, under strong pressure, can be compacted into clear ice. And these enormous heaps of snow, crowding, perhaps, into some valley as they go down, sometimes form an ice-river which, strange as it may seem, flows steadily onward till it reaches the warmer regions, where it melts and passes away. A glacier also may form over a broad extent of country without reference to valleys, provided there be a sufficient

accumulation of snow at some height in that country to create the mass and induce the requisite pressure.

The difficulty we have in comprehending such an ice-flow lies in the fact that in nearly all our experience with it, ice is very brittle and apparently unyielding. But experiments have shown that under a steady, strong, slow



THE GORNER GLACIER.

(From Dana's "Manual.")

pressure, ice will bend. Dr. Kane gives an account of the bending of an ice-table supported at each edge, though the temperature was all the time below freezing. And so those ice-rivers which we call glaciers bend round the turns, receive tributaries, and, in short, act in a slow way

very much as do rivers of water. In one particular, however, the ice-river is peculiar: if the bend is too sharp it will open in cracks and fissures on the convex side; and if it makes a cascade anywhere, instead of pouring down in a stream, it breaks in huge blocks, which at rare intervals fall into the abyss below. Some of the ice-rivers of Greenland make a fall in this way into the sea; and the blocks that break off and drop into the water float away and are known as icebergs.

The chief difference between a river and a glacier, however, lies in the rate at which they move. Often a glacier moves at so slow a pace, that except for careful observation we should not know that it moved at all. Hugi, the Swiss naturalist, built a hut on one of these ice-streams, and, returning to it three years afterward, found that it had moved 330 feet. Six years later it had advanced 2,354 feet; and five years later still, Professor Louis Agassiz made an observation there and found that it had been carried, since it was first built, 4,884 feet; making an average of about 349 feet a year.*

Slowly as these ice-rivers flow, however, they carry an energy which nothing can resist. Any human structure that should stand in their way would be crushed like an egg-shell; for they not only dig up the soil and tear away the largest trees, but break off immense rocks, which they sometimes round into bowlders, and sometimes crush and grind into gravel and sand. Along the shores of these rivers, especially toward their lower termini, are heaped up long lines of this material, which are called lateral moraines; and at the terminus of each of these rivers is

* Braun.

another heap of this material, known as the terminal moraine. Each glacier, of course, ends in a stream of water, caused by the constant melting of its lower end. But this melting begins at some distance up the stream, and the water sinks into the open cracks in the ice, and usually tunnels out the glacier for some distance on the under side. The end of a glacier, therefore, is likely to open as a kind of ice-cavern, from which a stream of water issues.

Glaciers, during the great ice-age, were no uncommon things. But that age did not come on all at once. It set in gradually. The warm climate and rich vegetation of the Miocene period extended into the Pliocene. But as the Pliocene age went on, there came a chill upon the globe. In what is known as the post-Pliocene age the chill grew to a winter, wrapping at intervals the whole northern hemisphere. And it is now the general opinion of geologists that our continents at that age, even in the temperate latitudes, were covered with a thick sheet of ice like that which now covers Greenland. It was not a winter of a few months. The evidence goes to show that its duration was immense. Lyell, who supposes that there were two ice-ages, with a milder interval between them, estimates the time that covers both as not less than 224,000 years. Professor Braun would make it much less, but apparently would give to the first ice-age a period of about 10,000 years.* It was a marvelous interruption of the creative work, in either case; and if Moses had a glimpse of this wintry desolation, it is no wonder that he paused in his story, and waited for a more hopeful vision before he began again.

* "Glacial Epoch," page 71.

There are several natural causes suggested for this period of extreme cold. One is, that the earth's orbit around the sun is more elliptical at certain periods than at others, and as this would throw the earth in certain parts of its orbit farther from the sun, it is thought that this might have produced the extreme cold. And astronomical calculations have been made on this basis, indicating how long ago the ice-age may have been, and when another like it may return. The more common explanation suggested is the upheaval of the lands of the northern hemisphere, and particularly those toward the north pole. High lands are cold lands; and any considerable elevation of the continents near the north pole would undoubtedly bring in an ice-age for the northern hemisphere.

But, whatever may have been the natural agency inducing this change, the evidence of its reality is very strong. One evidence is found in the existence of immense loose, rounded rocks, known as "boulders," which have been not only ground into their present shape by some tremendous agency, but transported to great distances from the bed from which they were broken off. Another evidence is found in the beds of sand and gravel, and small boulders known as "cobble-stones," that are distributed over such great areas of our northern continents. Glaciers now at work are constantly creating such material and distributing it. We call this material "drift," and in some cases it shows moraine formations, both lateral and terminal. Another indication of glacial action is found in "striated" rocks. That is, the bed-rock under the drift, in certain places, shows long, straight grooves and scratches, just such as a glacier makes in passing

over a rocky surface. The ice catches a flint-stone, perhaps, in its lower surface, and pushes it on, cutting a groove as it goes. So geologists are pretty well agreed that there was an ice-age following the Tertiary period, though some attach less importance to the glacial action than do others.

We have spoken of this age as one in which the creative process was arrested. So far as the appearance of new life-forms is concerned this is true; but if we include in the term "creation" whatever prepared this planet for the advent of man, then was creation never more vigorously pushed forward than during the great ice-age. The thick, wide glacier was God's instrument. The Niagara River was not running by the best channel, and so the glacier filled it from the whirlpool down, and made the river cut for itself a new course. The soil of our globe was too thin for the best purposes, and the rock lay too near the surface; so the glacier did the work of a subsoil-plow and tore up the rock to a greater depth, and ground the fragments into drift. It made great clay-beds beneath the drift and through it, to hold the water that fell from the clouds. And while along the coasts in different directions it cut out indentations to facilitate commerce, it also dug for us those little lake basins, such as gem our central regions in the State of New York. A rough agency was it; but the planet needed the plowshare, and the ice-age was the plowing-time.

Perhaps it did one thing more. It is astronomically certain that when our moon was thrown off into separate existence our forming planet had an inclination of only about five degrees to the ecliptic. Now it has twenty-

three degrees ; and this gives us our beautiful changes of season. Somewhere and somehow after the moon's formation, therefore, our world was tipped eighteen degrees. This may have occurred, as Professor Waring has shown, during the ice-age. The north pole, heavily loaded with ice-accumulations, would be tipped toward the sun. If the ice-age did that work for us, it was worth all it cost. In any case God's hand was in it, working all things "after the counsel of his own will."

CHAPTER XLIV.

A SPRING BLOSSOM.

THE darkest night is followed by morning. The longest winter opens into spring at last. And the call that brings in a milder climate after the long glacial winter and clothes the earth with life again, is "Let us make man." This call opens for us the second epoch of the sixth creative day. It dates next after the ice-age, and brings us to the final product of the entire creative work.

We are not to suppose that during the cold period all life was extinguished upon our planet. Some of those races previously existing indeed became extinct, but in other cases there was simply an emigration, whether of plants or animals, toward the tropics. The extreme cold urged all living creatures that had locomotion in the direction of the warmer latitudes; and the glacier itself, moving southward, not to speak of the winds and ocean currents setting in the same direction, carried the seeds and plants of the arctic regions to new places. Moreover, that glacial period of which we now speak was a phenomenon of the northern hemisphere only, and whatever life there was south of the equator enjoyed as favorable conditions as before.

But the time came for this winter season to close ; and so the high lands of the north subsided to their former level ; and once more the ocean currents set in from the tropics toward the poles ; and the mists and storms cleared away ; and the sun shone out warm again, and so the ice began to melt. The melting of course caused the glacier to drop the enormous loads of earth and gravel which it had been carrying, and so there were extensive deposits of drift. But the rapid melting of an ice coat, in some places fully a mile in thickness, created great rivers also, and these distributed the drift across the levels and along the valleys.

It was a time of spring-floods ; or, as a geologist would say, a diluvian period. We sometimes have a disastrous flood in spring time even by the melting of our ordinary winter snows. The earth is mantled perhaps to the depth of a few feet, when a week of sunshine or a tepid south wind sets in, and the snow rapidly dissolves, and so all the rivers overflow their banks, and there is a destructive inundation. But an ice-mantle contains more than twice as much water as a snow-mantle of the same thickness, and the ice of the glacial period was enormously thick. So when it melted, there were rivers roaring down the valleys that were like raging seas. In cases not a few, however, the glacier had heaped up its largest moraine at the mouth of one of these valleys ; or, as it melted, it deposited there its largest masses of earth and stone. This for a time would dam up the current, and then the valley would become a lake. At last this barrier would break away, however, and then the waters would be poured down through the country below, and there would be a tremendous ero-

sion. This time of the melting of the glacier, therefore, would be not only a time of great rivers, but a time for depositing and distributing the drift, and for the forming of wide tracts of country as lake-bottoms. Our American geologists call this the Champlain period, a name given it by Professor C. H. Hitchcock, with reference to certain deposits near Lake Champlain.

In some places, of course, this melting would occur earlier, and in some later. In the high latitudes, and up among the hills and mountains, the ice would linger, long after it had disappeared from the more temperate regions and the plains. Indeed, there are remains of that epoch that have come down to our own time. The ice-rivers of the Alps, and the ice-mantle of Greenland, mark those strongholds from which the old glacier that once covered all the lands from the north pole down nearly to latitude 40° has not yet been forced to retire. A conquered race sometimes maintains itself for many years in some broken highland region. So this conquered glacial epoch still holds its ground, not only at the poles, but much farther southward, if it find there only a mountain fastness of sufficiently difficult approach.

There was a great receding of the ice-masses, however, as the warm spring came in. And as they receded, and the drift was spread, and the alluvium formed, vegetation began to clothe the barren wastes, and the birds and beasts that had been driven southward returned to the former haunts of their kind. Among those clear cold streams also, which now flowed everywhere, there were sheltered nooks, perhaps within hand-reach of the ice itself, where majestic trees lifted their heads toward the sky, and where

amid the grass that carpeted the virgin soil flowering plants on every side swung their censers and cast their incense on the air. It was perhaps in such a nook that the one perfected blossom of all the earth appeared, which only needs transplanting to bloom eternally and to fill all heaven with its perfume—that wondrous spring-flower, man.

Moses gives us an account of the creation of this new and wonderful being, and traces a single line of descent, down from the original stock, to the Hebrew nation ; but he does not attempt to give us a continuous history of the whole human family. There were branches of the general household that migrated, and that were lost sight of ; and of which the only account we can obtain must be gleaned from much the same sources from which we gain our knowledge of the early animal creation. Human history, as to its earlier records, stands connected with geology ; and we find human remains as we do the remains of extinct species of animal life. Primitive man has left his marks upon our globe : flint arrow-heads, stone hatchets, ashes and coals from the fires he kindled, and his own bones covered in gravel-heads, or hermetically sealed under stalagmite in some cave. And judging by such relics man appeared in this world after the ice age, and about the time of the earlier Champlain. As the glacial epoch was closing, and the Champlain spring-time coming in, this new blossom opened, and this new plant ripened, the seed of which has since stocked all the continents and islands of the globe.

One of the early records concerning this new being is that the Lord God brought unto him the beasts and the

birds "to see what he would call them."* These were not precisely the animals of the Tertiary period, nor yet were they entirely the same as those existing in our time.



Elephas Primogenius, and other extinct animals, supposed to have been contemporary with Palæocosmic Man. — Tichorhine Rhinoceros, Extinct Hippopotamus, Machairodus, and Long-fronted Ox. The animals reduced from a picture by Waterhouse Hawkins.

The Tertiary creatures had either been destroyed, or else their natures had been so changed, during the ice age, that

* Gen. ii. 19.

it almost seemed as if a new fauna had been created. New species of the former genera were to be found, however ; and among these some of peculiar characteristics. The *elephas primogenius*, or hairy mammoth, was there ; and as the world opened again, vast herds of these creatures roamed over Europe, Northern Asia, and North America. The two-horned rhinoceros, known as the woolly rhinoceros, was also there ; and his thick outer coating gives color to the suggestion that certain tropical animals obtained arctic peculiarities during the glacial winter. And there were hippopotami, of a species not now in existence, and colossal wild oxen, and a species of giant elk, and cave bears, and many other creatures, bird and beast, of a sort not to be found in the modern era. If Adam saw all these great creatures, he saw some strange sights ; and there must have been some among them for which it would not be very easy to find a name.

Placed lord of this marvelous creation, man was charged to increase and multiply and replenish the earth and subdue it. First, he was to "replenish the earth ;" and this he did very rapidly. The early human stock was not only amazingly fertile, but, according to Moses, long-lived ; and from their original centre the swarming tribes went forth in every direction. It is more than probable that the race had found its way into Europe even before the deluge ; and when the great dispersion came, from the Plain of Shinar the migration extended eastward into China, and at length even across into North America, while westward the stream flowed on till it reached the Atlantic Ocean. It was the swarming time of our species—the fulfillment of the divine purpose, "increase and multiply and replenish the earth."

“Subduing” the earth came later. That involved the subjugation not only of the animal tribes to the service of man, but the subduing of the soil by tillage, and the mastery of all those natural forces which aid in the work of civilization. Replenish first; subdue afterward. That was the order in which the work was to be done.

CHAPTER XLV.

MAN AND BEAST.

MAN has an animal nature: is he an animal and nothing more? What does the sacred record indicate on this subject, and what is the corresponding testimony of nature? Moses puts this new creation among the animal tribes in one respect; for they and he are brought into being on the same creative day. The same epoch, as he describes the case, which produced the mammalia, produced this highest of the mammalian species, man. But the story indicates that in several particulars he is a being classed entirely by himself.

Thus, as already noticed, his creation is made a separate work. It occurs on the sixth day, but the work of that day is divided. There is first the production of cattle, beast, and creeping thing; and later, as quite a different thing, the creation of man. Some distinction, clearly, Moses intends to give him among the creatures made on the sixth day.

Moreover, the creative formula changes here. For the light, God said, "Let there be light;" for the grass, "Let the earth bring forth grass;" and for the sea-spawners, "Let the waters bring forth abundantly." But now the word is, "Let us make man." The earth is not called

upon to produce this new creature, nor the waters to generate him, as was the case with the lower orders of life. There is first a counsel on the subject, as if more than one were concerned in what is now to be done, and a kind of agreement and assent together, saying, "Let us make man." The consulting and assenting parties here may have been the persons of the Trinity, or the whole matter may be above our comprehension; but one thing is clear, man's creation is by this sentence set apart from that of all the creatures previously formed.

Moreover, man stands last in the order of creation, and so is naturally reckoned highest. We have seen at how low a point animal life began, and how successive orders of higher grade appeared. This has been the creative law. Each new order of life is above the one before it. The fish is above the mollusk; and the reptile is above the fish; and the bird is above the reptile; and the mammal is above the bird. If this law holds good for man, as a separate creation, then is man also above the mere mammal. One of the indications of superiority among the later animal tribes is the approach they make to an erect posture; and man has reached that posture so perfectly that it is impossible for any creature ever to go beyond him. Another indication of superiority, as stated by Professor Dana, is "cephalization" or the power and perfection given the brain; and in that respect none of the animal tribes make any approach to man.

It is also observable how man's creation is enlarged upon. Moses is writing a very hurried history. He dispatches his work in the briefest possible order. Two verses suffice him for the whole Tertiary period. But

when he comes to man, the rapid stream is checked in its flow, and the clear waters expand right and left, like a lake so pure that you may see every pebble at the bottom. Six verses in the first chapter, and seventeen in the second chapter, and considerable more in the fifth chapter, are devoted to the story of the advent upon our planet of this one creature, man. This indicates the importance the writer attached to this event. All the wonders of that Tertiary age, all the products of the reptilian era, and the era of the birds, all the long procession of animal life from the day it first dawned till the ice-age shut in upon our planet, goes for nothing in the comparison when he takes up the creation of this one small being, man.

The particular account given of the creation of the woman is to the same effect. This separates man from the inferior creatures. No such account is given of the creation of the female of the lion, or of the horse, or of the ox. Among the mere animals, everything is massed together, and numbers, tribes, and sex are lost sight of. "Cattle, creeping thing, and beast of the earth," says the record; and so the account is hurried through. But man is brought into distinct notice—a uni-sexual being first, a being afterward male and female. How to interpret that curious record of producing a new sex by vivisection we may not be able to say. But, be our interpretation literal or figurative, one thing is manifest, the act gives a distinction to the human race. There is for our species a double creation. The race appears in one sex first; and then, by a further creative process, appears as male and female.

Such are some of the indications that Moses intended

to rank the new being, man, as an animal indeed, but as something more. He has the animal nature, but in him it is perfected. He is of the dust, but God breathes into his nostrils an immaterial principle which he calls the "breath of life." The creative day on which he appears is the one common to him and the creatures of his class; but his part of the day is separated from theirs by an epoch in which the entire creative work is suspended, and his creation is entered upon as if a new day had dawned. A long, slow, creative process, extending over Archæan time, over Palæozoic time, over Mesozoic time, and over Tertiary time, producing creatures verging closer and closer upon the human range; then the long, silent pause of the glacial epoch, and then—"Let us make man!" Of the dust, but something more. This is that last formed creature, man.

CHAPTER XLVI.

THE DIVINE IN MAN.

IT will confirm the conclusions of the previous chapter to observe man's special relations to God. These are indicated very distinctly in the narrative as given by Moses. We have already observed in what direct relation God stands to man in the act of creation, and by how different a call he brings him upon the stage from that he makes to bring the animal tribes; but there are other circumstances bearing in the same direction. The record is full of them.

One is this: that man is appointed to stand in the place of God. "Let him have dominion," says the Word. It is part of the original consultation in regard to him: "Let us make man, and let them have dominion over the fish of the sea, and over the fowl of the air, and over all cattle, and over all the earth, and over every creeping thing that creepeth upon the earth." This was the proposal, and when man was produced the same words were repeated to him, and he was installed lord of all.

We accept our lordly position in this world with the feeling that it comes to us of natural right. The being at the head of creation, we say, should of course rule that creation. But man has no such right, except as it is

given him of God. It does not give a man the right to subjugate those of his own race, that God has endowed him with intelligence or power superior to theirs ; and no more does such superiority give him the right to subjugate the inferior orders of creation. God alone is the natural ruler of all created things ; and if man has the right to rule, it is by appointment of God.

His appointment to that position, therefore, is a thing to be well observed. The record of it is a remarkable one. To this being, last created, God says what he had said to nothing which he had previously made. "I give you authority," he says, "to subdue and dominate all the lower creatures. You may possess yourself of them. You may subjugate them to your service. As to them, I put you in my place. I create you my vicegerent. I take you out from among the cattle and creeping things and beasts of the earth, and appoint you in my stead to rule the world."

Another special thing said of the human race was that they were to be created in the image of God. This also was a part of the original consultation, even as it was a feature of the work when it was done. "Let us create man in our image," says God ; and then to emphasize the expression, after the Hebrew fashion, by repeating the thought in other words, he adds, "after our likeness." "In the image of God created he him. Male and female, created he them." So is this circumstance reiterated and dwelt upon ; and to show what importance is attached to it, the sacred record brings it out in many subsequent places.

What is meant by the image of God in man may not

be perfectly clear. Several suppositions may be made. One might be that it was a physical likeness; for, though God is a spirit and has no form, he has been pleased to assume a form at times, in which to appear to our race; and whenever he has done so it has been a human form. Man's form is thus the God-form. Besides, the Second Person of the Trinity, for the work of atonement, permanently put on this form. He was "the image of the invisible God." * He presented us a form in which we might know God; and as this was the same form in which God appeared so often in the Old Testament times, so was it also the form in which man was created. Man, therefore, even as to his physical structure, takes the God-form.

But another supposition may be made. The likeness may be one of the spiritual nature. The constitution of the human soul is framed, in its small way, after the God-model. Perception in man, so far as it goes, is like perception in God. So is judgment; so is the logical process; so is conscience; and so are the affections. In these respects man is a being like unto or in the likeness of God.

Nor is this all. There is a spiritual element in man which rises to a higher range; and in his best estate he is holy like God. This is that part of the divine image which was lost by sin, but which through grace may be restored again. The apostle speaks of a man's "being renewed in knowledge after the image of him that hath created him." † This is the work of the Holy Spirit upon the soul. The renewal is regeneration, and the

* Col. i. 15.

† Col. iii. 10.

knowledge is that of which our Saviour speaks when he says, "And this is life eternal, that they might know thee, the only true God, and Jesus Christ, whom thou hast sent." *

Either one or all these things may be included in the image of God ; but whatever it may be, one thing remains. It is something with which man is endowed, as distinct from all other creatures. We might say this even by comparison with the angels, who are never spoken of as "made in the image of God ;" but much more, of course, by comparison with the lower orders of the animal creation. The lion stands noble among the beasts, but it is never said that he was made in the image of God. The ape foreshadows the human form, but it is never said that he is made in the image of God. That distinction belongs to man, and it is a very high distinction. "In the image of God created he him ; male and female created he them."

Finally, we notice one special and significant act of God, by which this last-formed nature, humanity, is made complete. "And the Lord God breathed into his nostrils the breath of life, and he became a living soul." † This cannot mean simply that God made man a breathing animal ; for that was done for all the creatures inhabiting the dry land. They, in that sense, have the breath of life, as well as he, and, indeed, are called living souls. This record in regard to man must be understood as indicating something special in his nature, and as showing that he possesses an element of life which no other creature enjoys. God gives it to him. It is breathed into man from

* John xvii. 3.

† Gen. ii. 7.

God, as an emanation from himself. In the same sense in which other creatures are generated by physical nature is this being generated by the divine nature. And although sin may cut him off from his special relation to God, there are given to him in the gospel exceeding great and precious promises,* to make him once more a partaker of the divine nature, and to establish him forever as God's dear son and child.

It does not invalidate this statement at all to say that man was formed of the dust of the ground. As to his animal nature, this is true. On that side of his being he is earth-born even as the creatures below him. But this inbreathing of God imparts to him a spiritual nature, and links him as a new man to the Lord from heaven.

Putting all these things together, then, it will be seen that Moses sets man quite apart from the mere animal creation. Though he is an animal, yet is he just as certainly something more. Though his body is of the dust, even that is set in God-form; while as to his spiritual nature, he is directly from and begotten of his Creator.

* 2 Peter i. 4.

CHAPTER XLVII.

FROM THE DUST.

AND the Lord God formed man of the dust of the ground. In what sense are we to understand these words? Of course they refer to the human body, or more comprehensively to both that form and life which we have in common with the lower orders of creation. As to his spiritual nature, God breathed into man the breath of life: as to his animal nature, God formed it of the dust of the ground.

May we reverently ask what is the process involved in the word "formed" here? Did the Creator take a quantity of dust, literally, and moisten it, and mould it into a human figure as an artist moulds his "clay-form"? We shrink a little from the details of this suggestion; but the words of the narrative admit of this view, and it is one which a large number of people have unconsciously adopted. We may hold such a view and still believe the Bible; but there are other views which we may just as safely adopt.

Man may have been formed from the dust in quite another way. He may have been so formed, not immediately but mediately. As those of our race, living to-day, are of the dust through previous generations, connecting

them with a dust-formed ancestor, so that ancestor himself may be dust-formed through previous generations of a lowlier life, from which he may have been evolved. The Mosaic account is precisely as good for one of these theories as for the other. So far as the record shows, we have two things to believe, and no more: (1) Man was created by God; and (2) as to his animal nature he is an earth product, like the creatures that came into the world before him.

Professor Tayler Lewis* says on this subject, "We are not much concerned about the mode of production of his material or merely physical organization. In regard to this, there is nothing in the expressions 'he made' or 'he created him' or 'he made him from the earth' which is at war with the idea of growth or development, during either a longer or a shorter period. Ages might have been employed in bringing that material nature, through all the lower stages, up to the necessary degree of perfection for the higher use that was afterwards to be made of it."

President Potter,† of Union College, says, "If we meet the Darwinian with humorous reference to supposed apish ancestry, his retort is ready that an ancestry of clods is not less objectionable, and that the choice lies between animate and inanimate dust."

And Professor Winchell‡ says, "Is it less credible that man as a species should have been developed by secondary causes from an ape, than that by such means man as an individual should rise from a new-born babe or a primitive

* "Six Days," page 248.

† Letter to the "New York Tribune," Dec. 4, 1875.

‡ "Evolution," page 115.

ovum? It is no more derogatory to man's dignity, to have been at some former period an ape, than to have been that red lump of mere flesh which we call a human infant."

These are the words of men who stand too well as Christian believers to be put down with a sneer; and they are equally men who, as Christian scholars, have a right to speak on this question. And, while they refuse to be tied up to the system of Mr. Darwin, until it shall be more thoroughly established, they equally refuse to be tied up to an interpretation of Scripture from which we shall perhaps in a little time be but too ready to retire.

There may be men who accept the development hypothesis for the sake of making an assault upon all Christian theism. And such men may attempt certain inferences from that hypothesis, which would conflict with Holy Scripture. They may insist that as man derives his nature from that of the brute, he remains but a brute, though one of special culture. They may deny that there has been any inbreathing of God into man's nature, or that he is in any superior sense a living soul. And so they may deny the doctrine of immortality, and of sin, and of redemption. They may even deny the existence of God. But the hypothesis warrants no such conclusions; and should any exigency occur in which we must either give up our belief in the Mosaic history, or find in that history a place for the general views of creation held by Mr. Darwin, no Christian need be alarmed. As to this human creation, Moses himself says it is from the dust; and if so, it may as well be a development as an immediate creation.

If the Bible had said that God moulded a clay figure in human form, and then set it up, and breathed life into it,

we should of course be obliged to accept the statement as somehow true. But, as it says no such thing, we are not wise to invent so clumsy a theory and then rest upon it all our faith in the Book. The form into which God breathed that final nature that made it human may have been, so far as the record shows, for ages preparing. It may have been slowly brought up through countless generations of lowlier life. And the inbreathing may have come just as it reached the place where it had become a fit temple for an indwelling soul. We do not say that the Bible teaches this. We say it teaches neither the one thing nor the other. We only affirm that while the doctrine of the immediate, sudden, instantaneous creation of man is consistent with sacred Scripture, the doctrine of the natural development of his animal nature from some lower order of being, dust-formed, is equally so. An omnific word may have started the original germ. Another word may have set it higher and sent it on an upward way. And when it reached that point where it could be combined with a soul, God may have breathed into it that immortal nature, in the possession of which it fell from its estate of innocence, and afterward was redeemed through the death and suffering of Jesus Christ our Lord.

CHAPTER XLVIII.

DARWINISM NOT YET PROVEN.

IT will not be doubted that in these pages the development hypothesis has received at least fair treatment. An opponent is always entitled to an honorable warfare, whoever he may be, and no one can read the works of Charles Darwin without the conviction of his entire candor, as well as extensive research. But let it not be supposed that his hypothesis has yet been established. It presents grave difficulties, and they appear in far more formidable array when we turn to the works of God than when we merely read the sacred Word. The true method of assailing Darwinism is not to quote Moses against it. Moses was too cautious to commit himself on any such question. The field on which this controversy is to be conducted is the field of scientific research; and on this field Mr. Darwin himself says some of the difficulties of the system are "so serious that to this day I can hardly reflect on them without being in some degree staggered." *

If the development hypothesis were true, the line of life ought to be found ascending by insensible gradations from the lowest order of creation clear up to man. The earliest creation ought to merge in something next above

* "Origin of Species," page 133.

it, and that in something a grade higher, and the whole ascent ought to be an inclined plane without breaks or sudden uplifts. The human races are thus graded. They ascend imperceptibly from lowest to highest. The black race shades into the red, and the red into the yellow, and the yellow into the white; and so complete are the gradations that it is only by fixing arbitrary limits that we divide the human family into races at all. This is shown in the great variety of race-classifications which writers on this subject have advocated. Rev. Herbert Morris, D. D., in his "Present Conflict," quotes a large number of authors on this subject. "Tirey," he says, "divides them into two races, Jacquinot into three, Kant into four, Blumenbach into five, Buffon into six, Hunter into seven, Agassiz into eight, Pickering into eleven, Bory St. Vincent into fifteen, Desmoulinez into sixteen, Morton into twenty-two, Crawford into sixty, and Burke into sixty-three." This shows how the various human races blend together, and how arbitrary must be any line by which they are distinguished. And to fully establish the development hypothesis, we ought to be able to show that all life, from lowest to highest, blends in the same way.

Now, this cannot be done. Mr. Darwin admits it. The grade goes up from lower to higher indeed, but there are gaps in it, and apparently sudden uplifts. Mr. Darwin, it is true, holds that this is owing to the imperfection of the geological record, and says that every year's discoveries tend to fill up the gaps; but he says that in the present state of our knowledge, "geology assuredly does not reveal any such finely-graduated organic chain; and this, perhaps, is the most obvious and most serious objec-

tion which can be urged against the theory." * And in regard to the transition of organic beings from one structure to another, he says, "Here, as on other occasions, I lie under a heavy disadvantage; for, out of the many striking cases which I have collected, I can give only one or two instances of transitional habits and structures in allied species." † These are very candid concessions on Mr. Darwin's part; and were all his opponents equally candid, the contending parties in this field might directly begin to understand each other. Nevertheless, such concessions do not tend to create confidence in his system; for why should we accept a hypothesis in regard to which its own author confesses himself seriously "staggered," even to this day?

The gaps to be filled in order to make out a conclusion for the development hypothesis are yet enormous. The geological record is indeed imperfect, and something must be conceded for that; and it is true, undoubtedly, as Mr. Darwin urges, that something is being done each year to fill up the open spaces in what should be an inclined plane; but as yet the case has not been made out. Thus, the first vertebrates, which are the fishes, appear suddenly; and not the slightest trace of any connection has been discovered between them and the mollusks and the articulates next preceding. And this is the more remarkable, because the Silurian rocks, in which such traces should be found if they exist at all, afford embryonic forms of other creatures in large numbers. The facts are much the same with respect to the introduction of the mam-

* "Origin of Species," page 265.

† "Origin of Species," page 138.

malian species. The early Tertiary world was full of mammalian life, but, with the exception of a feeble marsupial or two, of a species that utterly perished, no mammal fossils have been found in the rocks of a previous time. And this abruptness of appearance characterizes the incoming of the mammal race, whether we read the rock record in tropical India, or temperate Europe, or our own country. "The abruptness of this transition," says Professor Dana, "is astounding." There is nothing to connect this kind of life with what goes immediately before. The facts are such as strongly to suggest a sudden new creation.

If we come down to the human period, the gap to be spanned is even wider. This will be more fully shown hereafter, especially by a comparison of the human brain with that of the creatures nearest man in structure; but what has already been affirmed will suffice to indicate the difficulties with which the development hypothesis must contend. The objection is not that the Bible is against it. As to that, if it were so modified as to admit of here and there an interposition of God in the progress of the creative work, it might well enough stand. Its difficulties occur on its own chosen ground. It cannot be harmonized with the ascertained facts of geological history. At any rate, it cannot be as yet so harmonized. We may indeed concede the plausibility of many of its suggestions. We may believe, if we choose, that the day will come when what has been so boldly theorized will be as a whole confirmed; but in the present state of human knowledge, and with such a record as is accessible, Mr. Darwin's theory must be regarded as a hypothesis, and nothing more.

CHAPTER XLIX.

WANTED : LIVING WITNESSES.

AS to individual life, there is such a thing as organic development. We see it in the egg, which gradually and before our eyes changes to a bird. We see it in the twig, which gradually and before our eyes changes to a tree. But we never see a mollusk changing to a fish, or a reptile to a mammal, or an ape to a man.

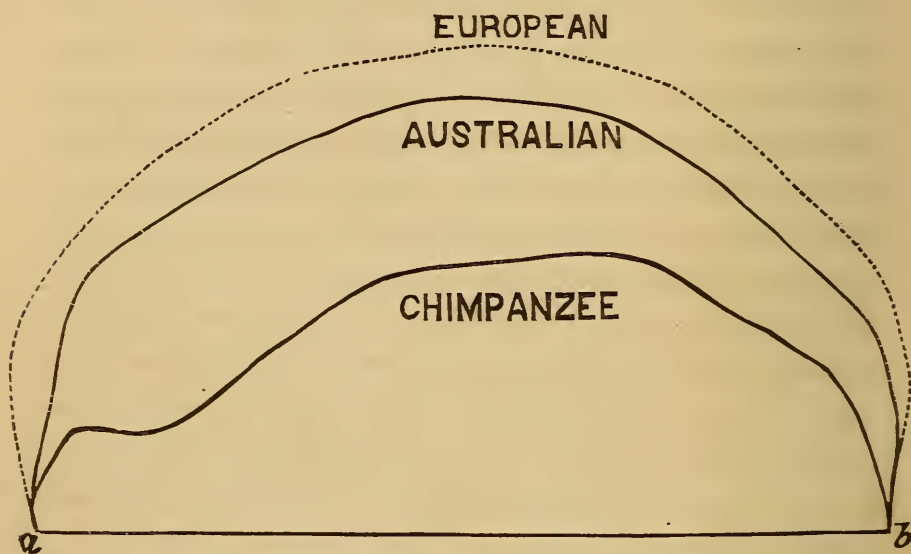
Yet some such process as this we must witness, if the development theory is to be sustained. Because, even were our inclined plane of life-forms fully made out, the question would still remain, whether after all the one of these forms grew into the other. We may succeed in filling up all the gaps in the system. We may find that what seems an abrupt termination in any case really is not such. But that will prove nothing till we see these changes actually occurring. There may be a row of houses in a street, carefully graded from lower to higher, but that will not warrant us in believing that the one grew out of the other. The first may be very small and poor, and the next a little better, and so on till we reach the last, which may be a palace; but that will only indicate a unity of design in the building. And so there might be a perfect

life-series from the lowest to the highest ; and yet unless we somewhere saw the lower in actual process of changing into the higher, we could only say, "Thus the Creator chose to arrange his work."

We ought particularly to be able to observe this process in creatures now extant. If the geological record is so imperfect, as Mr. Darwin contends, then the living record must the more be resorted to. And this record ought particularly to be clear, on the transition between the next lower order and man. The creature supposed to live next door to man is a species of ape ; and the theory under consideration presumes that it is a development of such an ape which produces man. But if so, we ought in all the history of our world somewhere to have found at least some one instance in which an ape was clearly in process of becoming a man. The better class of apes, during the thousands of years since apes came to our knowledge, ought to have at least shown some improvement in this direction, and to have become obviously more human in their structure, habits, and mind. But this has not been seen. There are pictures of apes and of men, on the walls of the Egyptian temples and tombs, that are at least 3,000 years old ; but they are precisely the same as apes and men are now. So there are mummies of apes and of men in Egypt, that have been preserved for the same length of time, and the ape is as much like a man and the man as little like an ape as now. Three thousand years, perhaps four thousand, have passed, and there has been no perceptible change in the ape or the man. All that period has done nothing whatever to close up the great gap between the two classes of being. And if three thousand

years has accomplished nothing, how many years will it take to bridge the whole chasm?

This chasm is very deep and wide. It is seen, in part, in the brain-structure of these two kinds of being. The largest gorilla brain yet measured, says Professor Huxley,* reaches a bulk of but thirty-five cubic inches. The smallest human brain is not less than forty-six cubic inches. The space of eleven inches constituting the interval be-



Outlines of the Skulls of an Adult Chimpanzee, of a Native Australian, and of an average European.

tween these two kinds of brain may seem small; but small as it is, it needs to be filled. We want a brain of thirty-six inches, another of thirty-seven, another of thirty-eight, and so on till we reach the forty-six. So the human brain gauges, from the forty-six inches up to one hundred and fourteen, which is the largest European brain; and so the ape-brain gauges from the thirty-five inches indefi-

* See the Duke of Argyle's "Primeval Man," page 57

nately downward. But between the thirty-five and the forty-six is this open space, as yet utterly unfilled. Moreover, below this space we find brute characteristics, and only such, while above it we find human characteristics so distinctly marked that they can not be mistaken. It may be but a separation of eleven inches of brain bulk ; but that may create a divergency that is heaven-wide.

Our argument is the more conclusive, however, in proportion as we take into account the whole anatomical structure of these two kinds of being. Man stands erect, and has a frame built for that purpose. The ape goes on all fours, and is built for that. Observe the pelvis of each. In the ape it is small, for it has nothing to sustain ; in man it is large, the haunch-bones flaring out so as to form a broad, deep basin, sustaining the abdominal viscera. Moreover, to these strong bones are attached those great muscles which sustain the human body in its erect position. To set the ape walking on two feet, his whole anatomy must be changed. Professor Huxley * says, " Every bone of a gorilla bears marks by which it may be distinguished from the corresponding bone of a man ; and in the present creation, at any rate, there is no intermediate link bridging over the gulf between homo and troglodytes." Of course it is claimed that this " missing link " will yet be found ; but the probabilities of such a discovery are not great ; and until the discovery is made, we must render our verdict — not proven.

Such are some of the facts, as pertaining to the development theory, which meet us on the field of nature. In general terms there is a progress of life from lower to

* " Man's Place in Nature."

higher. To some extent there is development, especially individual development. Nay, there is race development, at times,—better forms growing out of inferior forms; but there can be found no instance of one living species, properly so called, in process of changing to another species; and the geological record shows us the general life-progress made at times by abrupt transitions. One of the most abrupt of these transitions, and one of the most unmanageable of the breaks in the general system, lies next below our own race. We can find nothing to fill the wide chasm between the ape and the man. The record of the rocks, as to certain stages of creative progress, will admit of a development theory. Nothing can indeed be proved, but there are certainly significant hints of what might have been. As to other stages of that progress the interruptions are such as to indicate the interposition of a superior hand. Some of those interruptions may indeed yet be smoothed over, but in the present state of our knowledge the indications are (1) development, and (2) the rare but certain interposition of an Almighty Hand.

And how could anything better agree with the inspired record? Moses allows us room for a certain doctrine of development, as we have already seen. He almost uses the very term. The waters bring forth the spawner, and the earth brings forth the mammalia, and there is a dust-agent even in the production of man. But that is not all. There is a God at work also, and he turns these natural forces upon the wheels he would move, as a man would turn a stream upon his mill. There is a call, a command, a word in the case, and obedient nature re-

sponds. That call is not perpetual. It sets in motion a train of causes, and they work on till God calls again. A few times only is the call repeated during the creative process, but these few are of great account. In answer to the first the cosmic matter appears. In answer to the next there is motion. Then there is another, and we have light. And so, at eight or ten separate places direct creative energy is emitted, while for the rest things move on by natural law.

It is not a development without a God, but in some modified sense we can not deny that development is there. It is not a blind nature working on without an Author and without control, but it is nature after all; and there is the same manifestation of economy in the use of miraculous forces in this creative process which we witness everywhere. God does not break in upon the order of nature upon slight occasion, and for small purpose; but when it is necessary he breaks in. The breaks are the exception, and the on-going is the rule.

CHAPTER L.

PRIMEVAL MAN.

WHAT sort of being was this human creature when he first appeared on the earth? Was he possessed of well-ripened intellectual faculties? Had he extensive knowledge of nature? And was he what a man is now who has enjoyed a generous culture, and has been reared in the midst of a Christian civilization? Such a picture of primeval man would be quite too highly colored. Moses certainly tells us no such thing.

What then? Was he a being just emerging from the brute level? Was he a savage, fighting his way up toward civilization? And are we to look for the lowest type of man in that very early day? Such a sketch would be as much too sombre as the other was too bright. Mosés no more describes primitive man as a savage than he does as a being of civilized tastes and culture.

First of all, man stands before us in those days a *primitive* being. He is not a savage, he is not a brute; but he is as a little child. As to his dress, his style was primitive surely, for at first he went entirely unclad; and when he made his first attempts at garments, his success was just what might be expected. Fig-leaves first, coats of skin afterward—surely these were rude attempts; and

even these he did not make until he was driven out of "the garden."

A few of his treasures are mentioned in this early history : * "Gold, bdellium, and onyx stone," says our translation, but which Principal Dawson † believes to have been "gold, wampum, and flint stone." As to flint stones, we know what use uncultured peoples have always made of them, while wampum and gold are among the ornaments with which they deck their persons. Gold is the first metal the man learns to use, for that is found in a pure state. Brass and iron, the working of which implies some discovery in metallurgy, come later. So does the construction of the "pipe and organ," which phrase indicates those rude instruments on which our race first learned to make a musical sound. These things come in at the third generation, and in one specially ingenious branch of the human family. Generations were immensely long in those days, and other branches of the great family gained more slowly. Noah, at the end of about one thousand and six hundred years, builds an ark ; but as to its entire structure he has to be directed of God. The race had not yet reached the era of ship-carpentry.

God treats this new being much as one would treat a little child. He brings to him the animals "to see what he will call them." The great test of obedience he sets before him is a prohibition as to eating some fruit which grows there. And he walks with him and talks with him like a father with his child. The man also acts like a child. He attempts to hide among the trees when he hears God coming. He makes a very childish excuse for

* Gen. i. 2.

† "Earth and Man," page 310.

it when God calls to him. And, when detected in eating the fruit, he says, like a child, "She gave it to me"! Adam was created innocent, no doubt, and with a nature that was pure and holy; and, being so superior in moral qualities, he is often supposed to have been superior also in everything else. There is where we mistake. On the Bible showing, not only before his fall, but in the act of his fall, and after his fall, he was a very primitive being.

Yet, you notice an immense interval between him and the brute. Before he is shown to us as a completed human being, that superior nature has been breathed into him which allies him to God. Even his form is in some sense divine, and he has endowments which forever separate him from the creatures below him. One of these is the gift of speech, which, though not at first, perhaps, implying the possession of a very extensive vocabulary, is such as fits him at least for some simple discourse with his companion and with God. Not a merely cultivated animal surely is this being. Brutes have never yet been known to acquire intelligent speech, not even in its most primitive form.

Nor is this being a savage. The savage lives by the chase, but man's first employment is to dress the garden, and to keep it. Horticulture, or, in a wider sense, agriculture, is the first occupation of the race; and the first two sons of our general ancestor keep the flocks or till the soil. Some branches of the rapidly increasing family may soon become savages. Those who migrate farthest, and settle in the wilder districts, would be very likely to become such. But it is not as a savage that man begins his existence in this world.

Of the moral sense of this being, distinguishing right from wrong, and of his religious nature, distinct account is made in the record. He recognizes a God. He recognizes but one God, and he understands his accountability as God's creature. A child he may be, and an uncultivated child at that; but when he begins the world, he knows and fears God.

In regard to the date of man's appearance on our planet, we have no exact record. Moses sets him before us, indeed, immediately after that great break in his story which follows the mammalian creation, but he gives no year or century. In many Bibles there is a marginal note at the head of the first chapter of Genesis, reading "4004 B. C.;" but that is, of course, of no authority. There are also genealogies following, which at first seem to afford us a basis for close reckoning, but they are regarded as quite unreliable. As many as eighty different conclusions have been reached by men who have studied those tables; and the summing up of the whole matter is well expressed by Dr. Charles Hodge, when he says, "The Scriptures do not teach us how long men have dwelt on the earth."*

The location assigned to primeval man, geographically, is more closely marked. We may not be able to make out the actual site of "the garden," but sufficient data are given us to indicate the region in which the race first appeared. It was somewhere upon the River Euphrates. Several other streams are mentioned in the story, which it is impossible at present to identify, and which, perhaps, do not now exist; but the Euphrates is a stream we know.

* Theology, ii. 41.

On the Euphrates, then, and thus in a region central to the eastern hemisphere, man, as a completed human being, with body and soul, first walked the earth.

Some account is given of the country as it then was. It was a land of trees, and especially of fruit-bearing trees. It was a "garden" land, from which we may infer a fine alluvial soil; and it was a country well stocked with the "beast of the field," which means the easily domesticated animals, and with the "fowl of the air." Brooks and streams, orchards and groves, an alluvial soil, and plenty of "game," as we might call it, if Adam had been a hunter, made up the Eden where the Lord God placed the man.

There is a change in affairs then directly, and the man goes out to find a more sterile soil, judging by the "thorns" and "thistles," and to encounter a more severe climate, judging by the "coats of skin;" and elements of savagery develop in the race, till a flood comes and takes them all away; but the beginning was very favorable, and the place we know. In the region of the Euphrates, probably somewhere near the sources, and amid very happy surroundings, man begins the world.

CHAPTER LI.

HIS RELIGION AND HIS CIVILIZATION

IN addition to the inspired notices of primeval man, we have a record from which something can be learned of him in nature. It is not precisely a rock record, such as that by which we obtain our knowledge of the creatures which preceded him on the earth; for in the rocks, popularly so called, man does not appear. But his remains are sometimes found in caves covered with stalagmite, or in a kind of shell-rock of late formation, or in certain gravel beds; and from these remains and other like sources outside the inspired record, we can gather some information of his habits and his history.

One thing observed in this way, and admitted on all hands, is the recent origin of man. There may be some dispute upon this point when we come to measure by years his continuance on this planet; but such disagreements are very common on all geological questions. Geology may give us an idea of periods, but it can give us no exact measure of years and centuries. It can tell us in what order these periods have succeeded each other, but it can not tell us, within thousands of years, how long any period may have continued. It can say that certain things are "recent" in the grand succession of life, but

the word "recent" will in any such case be relative only, and can be defined by no exact dates. While therefore there is a wide divergence of views among geologists as to the number of centuries man has been upon the earth, there is but one view as to his "recent" origin. As Moses sets his creation last among living creatures, so geology, by universal consent, responds, "He was among the very last."

From the same source we learn that primeval man was a religious being. Our race leave their footprints wherever they migrate; and among the earliest of these footprints we find indications of a belief in a God and in a world to come. One of these is seen in the disposal that the early races seem to have made of their dead. We open one of those ancient graves and we find there something that was buried with the dead man as his outfit for his journey beyond. There is a fragment of pottery, the wreck of a drinking cup, by which he was to slake his thirst. There is a heap of arrow-heads, the remnant of the weapons with which he was to pursue the chase or conquer his enemies; and close by are the ashes and coals, left by the fire of the funeral feast, at which his surviving friends ate and drank to the rest of his soul. We have no remains of human life on earth earlier than such as these. We have remains of races, evidently savage, wild, "palæolithic," but nothing in which are not seen these dim recognitions of man's spiritual nature, and his anticipations of a world to come.

In various ways also, quite aside from the scriptural account, we have intimations of the kind of religion accepted by this primitive being. It has been shown by

Professor Tayler Lewis, in a masterly argument on the Primitive Greek Religion, that all the various systems of polytheism ran back toward a belief in one God.* He shows the likeness in this respect between the Dodonæan Oracle and that of Thebes, "both of which point us to a very early stage of religious belief and worship, when the



THE ORIGINAL CENTRE AND THE COURSE OF MIGRATION.

monotheistic idea was still predominant, if not exclusive both in the Hamitic and Javanic races."

Polytheism comes in later. It is not the religion of primitive man, but a descent from that earlier and purer faith. At the old centre, where our race originated, the old religion for a long time maintains itself; but as migration begins, and one tribe after another separates from the original stock, men lose their knowledge of the

* *Presbyterian Quarterly*, July, 1872.

true God. In the westward direction, to say nothing of the currents that set toward the east and the south, we trace two streams of human emigration from the old centre in Western Asia. One of these flows more rapidly than the other, because it makes its way by the Mediterranean, and for the same reason it keeps up its communication with the old centre. The other of these streams flows northward, between the Black Sea and the Caspian, and makes its way into Europe from that direction. The current in this second stream is slow. Dense forests, rough mountains, almost impassable fens, obstruct its course; and, when these obstacles are once surmounted, the gates are closed behind the advancing column, and all communication ceases with home. Southern Europe is thus colonized early, and the colonies from that direction, reaching the Atlantic, move up along the coasts, and possess even Britain; but in Middle and Northern Europe there comes in a later population, of whom the southern races have lost all knowledge, and who have become savage in the lowest degree.

Such was the emigration. Across the southern portion of the European continent a race made its way early, which, by all we can learn, long held to a monotheistic faith. The same race, reaching the Atlantic, pushed its way northward, and left its Druidical monuments on the British Isles, representatives of a religion bearing too strong a resemblance to the Dodonæan and the Theban faith to be merely accidental. Meanwhile, the so-called Scythian tribes, coming in from the other direction, and more completely severed from the old home centre, sunk to that almost irrecoverable condition described

by Herodotus and Tacitus as characterizing some of the more northern hordes. Each of these streams of migration makes its marks upon the country into which it flows ; and these marks all indicate that, however degraded man became, he always had a religion of some sort, and that his faith was simplest and purest as he kept up his communications with the old home centre, or stood nearest the primeval times.

Much the same discovery is made if we inquire for the early civilization of our race. The oldest empires of which we have any knowledge are such as Babylon, Assyria, and Egypt, and these empires stand close around the old home-hive on the Euphrates. Modern civilization, of course, we are not to look for at that early date ; but the more we learn to decipher Egyptian hieroglyphics or to read the "brick libraries" of Assyria, the more are we made certain that in that early day there was a civilization of a certain sort, lifting man as thoroughly out of a mere savage condition as does our civilization to-day. Babylon, and Nineveh, and Thebes,—what savage race ever built cities like these, and created monuments such as these can show ?

These are the oldest empires of the world. They are "prehistoric." Among the relics of ancient peoples we have nothing earlier to show. So far as has yet been discovered, there was no "neolithic" or "palæolithic" age before them. There they stand, in full glory, the gorgeous spring-blossoms of a civilization which, under Christian culture, should bear such marvelous fruitage in these later times. If you want to find a "stone-age," you must come over into Europe, tracking the lines of migra-

tion westward ; or you must come in still another stage, and fall in with those remoter stragglers who roamed our own continent before it was found by the European. Around the old home-centre in Western Asia, if there be a stone-age, it has come in since Nineveh and Thebes and Babylon fell.

The earlier civilization of Europe, like its earlier population, came in from the east, where the race was started. This was acknowledged even by those whose pride would naturally have committed them to an opposite opinion. To quote again from Professor Lewis : "With all their national vanity and boasting, the Greeks of the later historical ages always felt themselves to be a more modern people, a younger people, as compared with the Oriental and Egyptian nations. To them these were the 'old countries,' as the nations of Europe are to us. They were the old home-lands ; and the Greeks had a similar feeling of interest, if not of pride, in holding to a connection of their literature and mythology with those of these earlier peoples. This was carried even into their philosophy ; and hence the stories of Thales, Pythagoras, and even Plato, having traveled and learned in the East."

A religion far better than the later polytheism of our race, a civilization that laughs at such terms as "palæolithic" and "neolithic," was certainly to be found in the earlier ages, about the old home-centre of primeval man.

CHAPTER LII.

THE EARLY RACE AND THE EARLIER.

THE Bible tells us of an early race of human beings, and of a race still earlier. An early race was that which went out from the ark, and which spread itself abroad immediately after the deluge ; but the world had been populated long before that, by a race that began with a remoter ancestry ; and, according to the commonly received chronology, that race held possession of the earth for nearly two thousand years, being at last swept off by the flood.

Moses gives us quite a history of those early people. He tells us what a happy people they were at first, and how their circumstances, after a time, sadly changed. He tells us what a peaceful and innocent beginning they made, and how at length they corrupted their ways. He represents them as compelled to leave the garden in which God had set them, and to till a soil that bore thorns and thistles. He tells of the new kind of clothing they began to wear, "coats of skins," as indicating a severer climate. And he tells us how violent, or perhaps as we should say, how "savage" they became.

Not all, indeed : a portion of the race, though outcast from the garden, still maintained the fear of God ; but

the larger portion became degenerate. One family, descended from a man who had committed murder, migrated eastward, founding a colony; and this migration is called going "out from the presence of the Lord," as if it implied the loss of religious privilege, and perhaps the neglect of worship. Others, we may infer, migrated in the opposite direction, and a race of *nephilim* rose, the word being translated "giants," or strong men. At last, but one family of eight persons remained, who had not corrupted their ways; and then a "flood came and took them all away." It took away all except that one family. With that exception the human race on this globe became extinct; and it was from this family, who contrived to weather the catastrophe, that the world was populated a second time.

This is the record as given by Moses. He divides that dim early age of human history into two eras, separated by a great catastrophe. He shows us a human race that came upon the earth and held possession here for nearly two thousand years, and then became extinct, or nearly so. Then he shows us a second race, starting from a mere fragment of the former one, locating itself in the same region of Western Asia where the original stock was planted, and soon spreading itself abroad, to populate the globe a second time.

Those early migrations into Europe, which we traced in a previous chapter, belong no doubt for the most part to the second of these two races, but perhaps not all. Archæologists cover the entire primitive history of man with a single designation, and call it the stone-age, referring to the stone implements chiefly used by primitive

man ; but more recent observations have led to the division of that age into two eras, each of which bears some race-marks, peculiar to itself. Sir John Lubbock has suggested names for these two eras, and they have been quite generally adopted. He calls the earlier the palæolithic, or old stone era ; and the later, the neolithic, or new stone era ; but Dr. Dawson has well remarked that the use of stone implements is no indication of extreme antiquity at all, and cites in proof the case of the American Indians, with whom such implements were common till quite modern times. Instead of the word palæolithic, therefore, he uses the word palæocosmic, and instead of the word neolithic, the word neocosmic—the old world age and the new world age.

Meanwhile, a class of facts has been considered, on the basis of which a third ancient era* has been suggested, occurring between the former two. These facts consist mainly in the existence of the remains of arctic animals in the warm regions of the globe, indicating that there was a time when those regions were subjected to arctic weather. Thus the bones of the reindeer are found in great abundance in certain parts of Southern France ; and, to show that men were there at the same time, the bones are often found split by human hands to get at the marrow. A cold age is thus indicated, and it comes between the palæocosmic era and the neocosmic. Some call it the reindeer era ; some regard it as a second glacial epoch ; others doubt. But one thing would seem almost unquestionable : the palæocosmic era either was followed by or ran into a period of unusual cold. It will, perhaps,

* Dana "Manual," page 574.

be the simpler presentation of the subject to say that it ran into this cold period ; that is, as the palæocosmic era advanced, the climate became more severe, till at length even such creatures as the reindeer were driven far southward. As to the catastrophe which closed that era, it is sufficient, perhaps, to add that nearly all geologists agree that there has been at least one general continental subsidence since the glacial period passed away.*

Thus, then, do the facts of the case meet us, so far as science can determine anything in regard to the extremely early history of our race. Man appears close upon the heels of the retreating glacier. His remotest remains, now discoverable, represent two races—an earlier and an earliest. The time of the earliest race ran into a period of severe weather, reaching at last a point of extreme cold ; and finally, though science has not yet been able so to locate the catastrophe as to determine whether it came in between the old world age and the new world age or not, it does affirm that, at some epoch since the glacial period, the continents have experienced one very great subsidence, which must have placed large portions of the present dry land for a time deep under water.

So far, then, it would seem that Moses has once more curiously traced the outline of modern scientific discovery. The coincidence between his story and that from the other record may indeed be in part accidental, or some may count it imaginary ; but it is at least noticeable, and, taken with those coincidences marked in former chapters of this work, it can scarcely be counted less than significant. An early race and an earlier race, says Moses ; a

* Dawson, "Bible and Nature," page 153.

palæolithic race and a neolithic, says science. A race, the older of the two, clothing itself in skins, as against an oncoming period of cold, says Moses ; the palæolithic era, merging in the reindeer era, says science. A great catastrophe, says Moses, a flood, by which the most ancient race of man becomes extinct ; a continental subsidence, says science, somewhere this side the glacial era, I cannot tell where, which puts large portions of the present dry land under water.

Among the relics of this earliest age are several skeletons, or parts of skeletons, that have been disinterred from a cave known as the cave of Cro-Magnon, at Perizon, in the limestone region of Dordogne, in France.* There is evidence that this cave was used at one time as a human dwelling, and that afterward it was made a burying-place. Three human skeletons, taken from this cave, are regarded as probably the very oldest human remains in existence.† Two of these are skeletons of men, and one is that of a woman. One of the men was evidently very old, while the other might have been in the prime of life. The woman is judged to have been about thirty or forty years old. The old man was about six feet high, and his bones are such as indicate the strongest and most athletic muscular development. He must have been a very Samson in strength, says Dr. Dawson. Moses would perhaps have classed him among his nephilim. The woman presented similar characteristics, being a person of "immense size ;" and, even at this distance of time, her remains bear testimony to the violence of the age in which she lived. She died apparently from a blow received upon

* Dana "Manual," page 575.

† Dawson.

the right side of her forehead ; and, as the cut is clean, the blow must have been a swift one. Moreover, as it was in her forehead, she must have died with her face to the foe. She was perhaps killed while fighting at her husband's side in defense of their cave-dwelling ; and, judging by her stout bones, she could have fought like a veritable Amazon. She, too, might easily be reckoned one of the nephilim ; and the marks of violence she bears may well indicate such a state of things as existed, according to the Mosaic account, before the flood.

It is also worthy of remark that in each of these palæo-cosmic persons there is good brain capacity. We have noted the lower border of rational human brain-measure at sixty-eight cubic inches. The old Cro-Magnon man's brain-measure was seventy-five inches—not an inferior measurement at all. A fighting man, perhaps, was he—a savage, possibly, in his existing mode of life ; but evidently the off-shoot, not very remote, of a noble race. An antediluvian man this, perhaps, of a tribe of those “strong men” who had straggled over into Europe from Western Asia, and whose habits were marked by that age when “the earth was full of violence.” Dana refers these remains to the reindeer era. Dawson says they are clearly palæocosmic ; and, in the present state of our knowledge, palæocosmic man and antediluvian man seem very much the same.

CHAPTER LIII.

DETERIORATION.

THE degradation of a species, from a higher form to a lower, is one of the constantly recurring phenomena of geological history. Hugh Miller indicates this as a general law, and says that in each order of life "the magnates walk first." This is, perhaps, overstating an important fact, for the general tendency in each species is, for a time at least, in an upward direction. Nevertheless, the downward forces are often brought into play, and degradation and development work on, side by side, through long ages.

Moses indicates that there has been a degradation of some sort in the human species. As respects moral virtue, at any rate, there has been a "fall;" and this moral degradation exhibits itself in many phenomena that are purely physical. There are, indeed, spiritual forces at work upon our race which sometimes arrest this process; and where these have free play, men are elevated in some important particulars, even above the primitive condition of the human family. Christian civilization stands so far above the Adamic civilization as scarcely to admit of comparison; but the deteriorating tendency is strong, and where for long ages there is little

to counteract it, whole nations of men become degraded almost beyond recovery.

One of the occasions of the free operation of this tendency in our race is emigration. Dr. Horace Bushnell, some years ago, undertook to show that emigration tended to barbarism, and thus to sound a note of alarm to the American people, among whom to "go west" had become a kind of passion. He claimed that it could be shown that families moving out from the old centres and locating in unsettled regions showed a tendency to run down. They left behind them their religious privileges; they left in the same way their educational and social advantages; they became rude in dress and manners; they did not and could not keep up the refinement and culture of their New England homes. And thus he held that, however good the stock from which they descended, a few generations of "moving west" would breed a semi-barbarous population.

There is undoubtedly such a tendency, and it is very manifest in remote settlements and frontier populations. Emigration has indeed its advantages; and ultimately, under Christian influences, it may greatly improve the stock which at first it seems to degrade; but, separate from such influences, it always at first induces deterioration in certain directions, and sometimes ends, as Dr. Bushnell suggests, in utter barbarism.

This law, which we have had such ample opportunity to trace in America, is also illustrated in those broader race-movements which have marked human history. The early civilization of our world all appeared in the vicinity of the old home-centre. Assyria, Babylon, and Egypt

were empires that either rose upon the exact place where the human family were first planted, or sprang up close by; and those tribes that straggled away into remote regions, and became separated from the old stock, were found at length reduced to the condition of savages. The law was this: both civilization and religion were kept at their best estate near the old centre; and the one was corrupted and the other lost as men migrated and separated themselves from the home of the race.

Professor Guyot illustrates this law by a very broad generalization, in his "Earth and Man." He begins by observing how the lower orders of creation are improved as they come under the intense light and heat of the tropics. Thus, with respect to vegetable life, he calls attention to the fact that, in the arctic regions, the mosses and fern-like plants chiefly prevail, while in equatorial countries even the grasses are developed into canes that run up thirty feet high. Then he shows the same law in animal life, though in a less perfect manifestation, because animals possess locomotion, and can somewhat change climate, while each plant is stationary. Thus the tropical birds and insects present themselves in boundless variety and brilliant coloring, while the pachyderms of the same region reach an enormous bulk, and possess amazing strength. Then there is the force and ferocity of the carnivora, such as inhabit the deserts of Africa or people the jungles of India. Even the intelligence of these creatures is developed in great degree, and their forms more and more approach that of man.*

To this rule, however, the one supreme animal, man

* "Earth and Man," page 252

himself, forms a strange exception. His nature does not reach its height in the tropics, but in the temperate regions. Man at the equator, like man at the poles, is a deteriorated being; he was created in, and belongs to, the temperate zones; or rather, to one of these zones peculiarly, that which lies north of the equator; there, says Moses, God first placed him, and there, says history, he has developed the best physical organization, reached his highest civilization, and maintained his best religious faith.

The most perfect type of physical humanity is the Caucasian or white race; and this race by its very name is linked to the old home of our species in Western Asia. Where man was first formed, there we still find him best formed; and as we move out from that latitude, whether north or south, we find, as a rule, race-degradation. We go on nearly the *same* latitude westward into Europe, and, at present, we find civilization, and a well-developed physical man; because the modern European is Caucasian, because he continues in the temperate zone, and, most of all, because those spiritual forces prevail in Europe, which the Christian religion exerts. But in primitive Europe, as we have seen, even the Caucasian blood did not save the race; the knowledge of God was lost, and those tribes became savage, and were brought up again only by renewing their connection with Western Asia and receiving its light once more.

As we pass down into Africa, the deterioration is soon manifest. There was indeed an early civilization in Egypt, but even that has long since departed, and the physical type of man conforms to the altered condition of

things. The Arab shows it in his retreating forehead ; the Abyssinian Galla in his protruding lips and frizzled hair ; and after this we come to the Guinea negro, the Hottentot and the Bushman, who end the downward scale. As we follow down Eastern Asia, much the same state of things prevails ; the series ending in the indigenous Australian and New Zealander. Running down the Western Continent, we find at a similar extreme the Patagonian and the Terra del Fuegian ; while, if we make our explorations in a northward direction from the same original starting-point, we reach, at the extremities, the Finns, the Laplanders, and the Esquimaux.

These facts, brought out by the distinguished scholar just mentioned, tell their own story ; they indicate that the stone-ages of our race are not necessarily the earliest ages, nor the palæolithic men necessarily those of the primitive stock. They show us how important it is, in studying the deep problem of our species, to take into account not only our capacity for development, but equally our capacity for and tendency toward deterioration. Emigration and consequent isolation, unless counteracted by special spiritual forces, tend in the direction of barbarism. There has been a fall ; and these downward tendencies unresisted tell at length even upon the physical constitution ; the human becomes subordinate in us ; the animal more and more gains ascendancy ; and if the ape has any connection with man, it is quite as possible that he is a degraded offspring of some low type of the race, as that he is our general ancestor.

CHAPTER XLVIII.

OF ONE BLOOD.

MOSES gives the account of the creation of just one pair of human beings, and traces from these the descent of all the peoples of the earth. That original pair were made conscious of their position in this respect: and Adam called his wife's name Eve, the life-giver, "because she was the mother of all living." * The Apostle Paul broaches this doctrine in his address to the Athenians, and says that God "hath made of one blood all nations of men, for to dwell on all the face of the earth." † Paul was a Jew and had learned this important truth by the study of Moses, and he set it in a high place in the Christian system. The root doctrine of Christianity, native depravity, is found here, and the corrupt nature, of which we all become conscious sooner or later, is accounted for by "one man's sin" and fall. ‡ Out of this springs the additional doctrine of regeneration by the Holy Ghost, and on the same stock is grafted that work of the "Second Adam," by which an atonement is made for our sins. Our Christian system, therefore, and no less our Christian

* Gen. iii. 20. † Acts xvii. 26. ‡ Rom. v. 19.

feeling, has been adjusted to the notion that the entire human race are of one parentage and constitute one family.

The tendency of most of our scientific theorizing at the present day is quite in harmony with this view. Professor Louis Agassiz, indeed, questions the doctrine pretty sharply; but on this subject men of the class of Mr. Darwin rather go to an extreme in the direction taken by our Christian theology, not only assigning a common origin to the human species, but massing both men and animals in one family having one ancestral germ. A few suggestions, therefore, will perhaps be sufficient on the question of the unity of the human species.

That the several branches of the human family greatly differ is obvious enough. One race is black and another is white; one race is savage and another is civilized; and, in respect to features, form, language, habits, tastes, there is such broad diversity, that it is not wonderful that some have held that each of the different races had a distinct creative origin. Perhaps in nothing are these diversities more conspicuous than in language; to learn all the languages of the world a man would need to work for a whole life-time. As to this, however, Moses explains a little, and says that there was a divine intervention in the case, "confounding" human speech and dispersing the early races abroad;* but, even in this difficult department, there is a certain unity running through the entire diversity; and all our later studies confirm the doctrine that the whole multitude of human dialects sprang from one common root. As to other human diversities, the

* Gen. xi.

same general remark may be made. They are not such as to exclude the idea of a common origin for our species.

The argument for unity of species in man is strong ; it is made out first, by noting the unity of our mental characteristics. There are indeed great differences of mental endowment, and these are still further enlarged by differences of culture, but the constitution of the human mind is ever the same ; memory in one man reveals the same general laws as memory in another ; conscience in one man is the same faculty as conscience in another ; and so are perception, judgment, fear, hope, hate, love, joy, sorrow. Just as you can always calculate upon a certain disposition in the lion, making up his lion-nature, so you can always reckon upon certain elements in a human mind, making up man-nature. Each new race of human beings whom you may discover, no matter how isolated they may be, will have certain characteristics, to be either guarded against or depended upon. Man is an animal to be met and managed, and mastered, always by an appeal to essentially the same class of sentiments ; you have to guard yourself against him in all places alike and for the same reasons ; you have to judge, on the same general principles, everywhere, how he will conduct himself and what he will do.

This race-unity is particularly manifest when you take into account not only his intellectual nature but his spiritual powers. Wherever you find a human being, you will discover in him the capacity for a knowledge of God ; it will be more than a capacity ; in some form, more or less distinct, that knowledge will be found already in his possession. He will have a religion of some sort ; he will

offer some kind of worship to some kind of superior and invisible being ; you can depend upon this element in his nature, just as you can depend upon him to resent it if you insult him, or to seek revenge if you injure him. Man is as certain to have in him a religious susceptibility as the lion is to be a flesh-eater, or the ox a feeder on grass ; he holds to the doctrine of a future state ; he holds to the importance of making some sort of preparation for that state ; he holds to the existence of some invisible being, or order of beings, superior to himself, whose wrath is to be appeased and whose favor is to be sought, at whatever sacrifice.

The element of depravity will also be found in men everywhere. In all voyages of discovery the rule has been found necessary to approach the people of strange countries with much precaution. It is expected that, among every new people, there will be treachery, theft, perhaps a thirst for blood ; and, where voyagers grow careless on these matters, they sometimes pay the forfeit with their lives. These elements of depravity, or others like them, are to be looked for with as much certainty as anything in the race. Peculiarities proceeding from this origin will be specially observed if you meet human nature anywhere with the Christian religion. As a rule, men will at first oppose that religion, or at least show themselves indifferent to it, and this will be the case not only among those peoples to whom that religion is strange and new, but among multitudes who accept it as the true faith. Depravity will always, to some extent, be found working against Christianity—the deteriorating tendencies of human nature stoutly resisting those spiritual forces by

which alone the deterioration can be effectively counteracted ; and, if the spiritual forces prevail so that men become really Christianized, then the result will also be the same in the upward direction, the world over ; civilization will at once spring up, and the story of the individual experience of the saving love of Christ will be told everywhere in the same way. The love of God in the heart finds the same expression, whether among the British Islanders or the Sandwich Islanders ; among those who embrace the Lord Jesus Christ in our own happy America, or those to whom the gospel story is told in the far-off Zulu land.

If we bring our argument from the physical constitution of man, it is equally conclusive. Cuvier taught the world how to classify genera and species by comparative anatomy, and with scarcely more than a single bone of some extinct creature he could proceed to construct its entire form. As an evidence of the correctness of such theoretical reconstructions, certain drawings of the hairy elephant may be cited. Such drawings were made from the dissected bones of the creature, as found in various places, while it was still supposed that no human being had ever seen the animal itself. But, among the human remains of the so-called reindeer era, Lartet found a piece of ivory, graven by human hands in that ancient time, with a figure of this same curious beast, matching almost precisely the theoretical figure which the scientific men had first drawn. Nay, a carcass of the elephant itself was found, at a still later date, encased in the ice, in Siberia, which still further confirmed the conclusions of scientific men.

To the comparative anatomist, therefore, our argument from the bone-structure of a human being would be likely

Hairy Elephant, engraved on a Piece of Ivory, found in the Madelaine Cave, France.



to be entirely satisfactory. Such outward peculiarities as a dark-colored skin, or protruding lips, or frizzled hair,

would not, with him, have the greatest weight. Give me an idea of the bone-structure, he would say ; or show me the muscular apparatus, the digestive organs, the blood-system. Well, these are found the same in man the world over.

How thoroughly this physical uniformity is depended upon, we may judge by the implicit confidence with which a skilled practitioner undertakes, in any part of the world, an operation of surgery. Some such operations are very critical ; and if the surgeon's knife be deflected from its true course but the sixteenth of an inch, in certain parts of the body, it may sever an artery, and end the patient's life. But a man learns surgery in Philadelphia, and goes straight out to practice it in Calcutta or Hong Kong. He cuts as boldly into a human body among the people of India or of China, as among the people at home. European, Malay, Negro, whatever the race may be, to him it is all one. Bone answers to bone, muscle to muscle, nerve to nerve, intestine to intestine ; and heart, liver, artery, vein, each lies in its own place, serves the same purpose, and must be treated in the same way, whether the operation be performed on one side of the globe or on the other. Anatomically, therefore, and physiologically, as well as intellectually and spiritually, the human race, everywhere, is one. There may be a flattened nose, or a protruding nose ; there may be woolly hair, or silken hair ; there may be a black skin, or a skin of pearly whiteness, but

"A man's a man for a' that,"

and God hath made of one blood all the nations for to dwell on all the face of the earth.

CHAPTER LV.

HOW OLD ART THOU?

HOW many years has this last created being, Man, been upon the earth? Once this was regarded as a very simple question. You had but to open your Reference Bible, look at the head of the first chapter of Genesis, and read the date, "4004 B. c.," when lo! all was plain. If you were living in the year 1870 A. D., this had but to be added to the 4004 B. c., and there you had it — 5874 years since man was created.

But, unfortunately for our peace of mind, it was discovered that the date in the Reference Bible was quite unreliable, and that the genealogical tables from which it was made up involve questions both of authenticity and of interpretation, among the most difficult presented anywhere in the sacred Word. Moreover, the archæologists began to take hold of the question, and, from the facts which they gathered, it began to be assumed that the traditional time of man's continuance on the earth was far too short. That he was among the very last of the "creations" was indeed readily conceded; but the theory that he first appeared on our planet about six thousand years ago was scouted. "Not less than a million of years," said one authority! "At least thirty-seven thou-

sand," said another ; and the poor little space of the traditional six thousand shrank into insignificance.

A little vigor was, perhaps, lent to certain researches in this department, by the feeling that, in making out a very long continuance for the race on earth, something would be done to overthrow the prevailing "superstitions" in regard to the authority of the Bible. There have always been men in the world, to whom such a book as the Bible is an offense, and this question of the antiquity of man seemed to open a convenient opportunity to get that offense somewhat out of the way. In the eagerness of the debate, therefore, some arguments were advanced which do not very well bear examination. It is not obligatory upon the friends of the Bible to prove that man has been upon the earth only six thousand years, but it is their plain duty to examine the evidences by which his existence here has been set down in such enormous periods ; and if any mistakes have been made in constructing such "evidences," it must not be expected that the fact will pass unchallenged.

One of the earliest empires into which the race was builded was Egypt, and if evidences of any extraordinary human antiquity were to be sought anywhere, it was natural that they should be looked for in that ancient land, for Egypt is not only an old country, but it has a peculiarity of climate by which all ancient things are remarkably preserved. The pictures that still retain their color in some of the Egyptian temples would, in our country, long since have mildewed and disappeared. The pyramids themselves, exposed to our alternations of rains and frosts, would have crumbled into dust-heaps, ages

ago ; but in that clear, dry, and never frosty air, such things last on from age to age.

When Napoleon Bonaparte was in that country, two of the ancient temples there were explored, each of which had a figure carved from wood and painted, and fastened to the ceiling of the temple, representing that belt of sky which we call the zodiac. In each of these figures the position of the stars and planets had a peculiar arrangement, and quite naturally it was supposed that this position was the one which those bodies occupied at the time these figures were constructed. Immediately, therefore, the astronomers set themselves to calculate the period of this special conjunction, and one of them made it out to be not less than fifteen thousand years ago ; and as, up to that time, the tradition had prevailed that man had been upon the earth only about six thousand years, the result of this computation was a little startling. True, it had not been proved that the wooden zodiacs were intended to represent the position of the heavenly bodies at the time when they were carved out ; but that small circumstance was not much thought of, and the conclusion was accepted that there were men in Egypt studying astronomy and building temples at least nine thousand years before the date supposed to be assigned in Scripture to the creation of our species !

It so happened, however, that the younger Champollion was in Egypt at this time, studying the hieroglyphics, and, learning the interest that was taken in the zodiacs, particularly by the people in Paris, he took the pains to visit these temples, and very fortunately discovered that each zodiac had an inscription, evidently engraved upon it

at the time it was made. He deciphered one of these inscriptions, and found in it such words as "Emperor, Claudius, Nero, and Domitian." The makers of the zodiacs thus had inscribed them with these names; and if they were acquainted with these names, they must have lived at least as late as the first centuries of the Christian era! So much for the fifteen thousand years! It was a pity to spoil so profound a calculation; but the inscriptions did the work, and, from that day to this, the argument from "the Egyptian zodiacs" has not much been heard of.

A second argument for the antiquity of man, based on Egyptian data, has been derived from the measurement of the alluvium deposited by the River Nile. The Nile, during its flood, brings down vast quantities of earthy matter, which it distributes upon the soil, and thus year by year a bed of alluvium slowly accumulates. It has been attempted to show at what rate this accumulation progresses, and, from some careful observations, the average reckoning is made of about five inches for every one hundred years. With this as a standard, of course, it is very easy to show how many years any particular depth of alluvium has been forming. Fifty inches, or a little over four feet in depth, will represent a thousand years; and if anything is found at that depth beneath this slowly forming soil, the inference might be that it was placed there a thousand years ago.

Of course, there would be some weak places in this argument, but they would not, perhaps, be much noticed. Thus a man might dig a pit or a well four feet deep in this alluvium, and something might fall into it, after

which, perhaps in the course of a year, the pit would be filled up, and so the depth at which the article would afterward be found would prove nothing; or the Nile might cut a new channel, as it often does during high water, and in a second flood the channel might fill up again, and so things quite modern might be found at a great depth. But, neglecting all such considerations, a boring was made a few years ago, in this Nile-deposit, to the depth of ninety feet, bringing up a piece of earthenware, the work of human hands. Well, this ninety feet, on a scale of five inches to a hundred years, represented twenty-one thousand six hundred years! Thus it was in evidence that a pottery-making people lived in Egypt twenty-one thousand six hundred years ago! That was better than the zodiacs; and if any one doubted, there was the bit of pottery, and it could speak for itself. It did speak. Experts in archæology questioned it, and it rendered up its secret so as to admit of no further doubt. It was Roman pottery, and, therefore, less than two thousand years old!

How it got there, no one seemed to know. The boring might have reached the bottom of some old well, or some former channel of the Nile, into which this piece of earthenware had accidentally fallen. But even a more plausible supposition than that is admissible. Persons who have traveled much in the East know how ready the people are there, for a little reward, to gratify curiosity-hunters, and to find any antiquity that may be desired. If the Arab workmen at this deep boring had been charged to preserve any relics they might find, and especially if some reward were offered, they would be certain to find

something. But, however that may have been, the argument from the Nile-deposit has not been much insisted upon, since Roman pottery was found, that, according to the scale of reckoning, would be twenty-one thousand six hundred years old !

CHAPTER LVI.

THE SAME SUBJECT CONTINUED.

ANOTHER evidence of the extreme antiquity of the human race is supposed to be found in certain caves. Human bones, and other remains of human life, have been discovered in such caves, and, since the time when such remains were deposited there, the caves have in some cases been flooded with water. Moreover, in some cases, such caves open into a cliff more than a hundred feet above the present level of any neighboring stream or body of water. Several such caves are found in Belgium,—one, the Trou des Noutons, is in the valley of a little stream known as the Lesse, and opens at the height of about one hundred and ten feet above that river. The argument in such a case is this: that the cave must have been flooded by the stream; that, when it was thus flooded, the stream and the cave must have been at nearly the same level; that since that time the stream must have worn its way to the depth where we now find its bed; and that to wear its way to such a depth must have required many thousands, if not hundreds of thousands, of years; therefore, it is concluded that man was upon the earth many thousands, if not hundreds of thousands, of years ago.

The short answer to this argument is, that there has been, in comparatively recent geological times, a great continental subsidence, bringing in a general deluge. This subsidence, so far as we now know, may have occurred since the human race existed. It may, in short, have been "Noah's flood," and these cave-bones may be the remains of the antediluvian world.

The most conclusive evidence on this subject, however, has been supposed by some to be found in those caves where human remains are sometimes discovered buried under a thick stalagmite formation. Stalagmite forms very slowly. It is the product of dripping lime-water. Such water, falling by single drops upon the floor of a cavern, evaporates, and leaves a deposit of lime. This product is the stalagmite; and years and years are sometimes consumed in creating such material of the thickness of one inch. So, when such a deposit covers any part of a human body, or any relic of human handicraft, to any great depth, it is evidence that human beings were in existence a very great while ago.

The most conspicuous instance of human remains so found, occurs at a cave known as Kent's Hole, near Torquay, on the coast of Devonshire, in England, where such productions as flint arrow-heads were discovered some years since, over which there was a stalagmite floor, in some places three feet thick. Above this floor, moreover, there was a layer of "black muddy mould" about one foot thick; and still above this, numerous blocks of limestone that had fallen from the roof, and that were partly cemented by stalagmite.* These deposits and accumu-

* "Recent Origin of Man," by J. C. Southall, page 197.

lations are naturally supposed to represent a vast period of time. One writer puts it, at the very lowest, at a million of years.* Man, as he reckons, must have been on the earth, making flint arrow-heads, at least a million years ago.

But, alas for the uncertainty of earthly things, these stalagmite formations prove in practice about as unreliable for time-keepers as the Nile-deposits themselves. The author of this work made a journey, in the year 1872, up the coast of ancient Phœnicia. Our party had just passed the "Ladder of Tyre," when we came to a swift stream, gushing from a fountain near by. The water of this fountain is held, at the head, in a great reservoir, from which it is in part conducted away by a Roman aqueduct, supported by arches of solid masonry. We rode under these arches on horseback quite easily, showing them to have been about ten feet high, and found large columns of lime-deposit, some of them at least two feet in diameter, which had been formed by the slow drip of the water from the aqueduct, and which reached from the ground to the masonry above our heads. Now this would not be called stalagmite, but it was formed by the very same process, though perhaps more rapidly. At any rate, it was plain to be seen, and it had all accumulated since the Romans went into that country, or in about two thousand years; and the argument is, that if this deposit of ten feet in solid depth could be formed in two thousand years, then the three or perhaps five feet of stalagmite at Kent's Hole might have formed in somewhat less than a million of years.

* "Recent Origin of Man," by J. C. Southall, page 220.

Professor Winchell, as quoted by Southall, says that in one of the lead caves, near Dubuque, Iowa, stalactites three feet long formed in three years. And from the same authority we also learn that Captain Brome found a copper plate, of the date of the 12th or 13th century, in the St. Martin's cave at Gibraltar, under eighteen inches of hard stalagmite, though the stalagmite itself was covered with six feet of cave earth. Here was real stalagmite, "hard" stalagmite; and eighteen inches of it had formed in six or seven hundred years. . At the same rate, three feet would form in 1400 years, and five feet in a little over 2000 years. What becomes then of our "million of years," supposed to be demanded to produce the five feet of stalagmite at Kent's Hole? It could all have accumulated within the Christian era.

Some of these reckonings in the department of human antiquity are thoroughly amusing. One such is noticed in "The Nation" of October 28, 1875. "The Nation" has no special prepossession in favor of Moses, nor any prejudice against modern speculations in archæology. Its statements, therefore, may be presumed to be candid. They are as follows :—

"Now that science neglects nothing which will illustrate the history of man, it behooves scientists to be careful as to their authorities and wags to be merciful in their demands on human credulity. Our readers will doubtless recollect the currency obtained a few years ago in both hemispheres for a wild story of subterranean chambers opened in the excavations made for the St. Louis bridge. Some weeks since we observed in a Western paper a burlesque account of a cave discovered on the upper

Mississippi, so grotesque in its details that the joke appeared too broad even for its object. Yet in so grave a periodical as the London 'Lancet,' of October 9th, the story comes back to us treated with all seriousness. How far it has been disseminated it would be difficult to say, for the 'Lancet' gives the 'Union Medicale,' of Paris, as its authority for the statement 'that in an island in the Mississippi a human skeleton has been found supplied with a wooden leg. The latter was fixed to the trunk with leather straps and some bronze-looking metal which had turned fossil,' and it adds the sage remark: 'Thus it would appear that oak as well as metal were [*sic*] used in prehistoric times.' In the next editions of the researches of M. Lartet and Sir John Lubbock and Mr. Tylor we shall look to see extensive deductions drawn from this 'fossil' metal and this 'prehistoric' leather."

This brings to mind another discovery in the same line, located in the same region in this country. The alluvial deposit of the Mississippi is much like that of the Nile; and the Mississippi, more than the Nile, is given to cutting new channels, at the time of high water. Moreover, as a flood will cut a new channel in a single season, so will it sometimes fill up some old channel during the same length of time. Almost any sort of modern implement or relic, therefore, might be found at almost any depth in the alluvium, anywhere near the banks of this great river.

But when a deep cutting for railroad construction was made at Port Jackson, a few years ago, and pieces of wood were found at the depth of twenty feet, quite an argument was made out thereby for the antiquity of man. Those pieces of wood had been worked, it was said, by men who

possessed some degree of civilization. There were plain marks upon them of such tools as the auger, the ax, and the saw; and it was estimated that these relics were buried there about 57,600 years ago; so long, it was said, had this deposit been accumulating, and, therefore, so long ago had men lived on this continent, sufficiently civilized to use the auger, the ax, and the saw.

At the time of this discovery, there existed at New Orleans an organization known as the Academy of Science, and this academy took sufficient interest in the report to send a committee to investigate the case. The committee accordingly appeared at Port Jackson, and found the facts precisely as reported. There was the deep cutting for the railroad in the alluvium, and there were the pieces of wood, twenty feet below the surface, bored, chopped, and sawed. They exhumed one large piece of this relic and carefully examined it. It was a stick of "yellow poplar," such as still flourishes along the Mississippi, and had constituted the gunwale of a Kentucky flat-boat! How it came there was sufficiently manifest—it was in an old channel of the river, which had been filled up with alluvium by a freshet in spring time: the committee returned to New Orleans, much like the stick they had found—badly "bored."

A singular fatality has thus attended some very hopeful efforts to greatly extend the reach of human antiquity, and Dr. F. Pfaff, as quoted by Dr. Herbert Morris, says that we find "no traces of man, with any certainty, further back than the great climatic changes of the quaternary period," and that the most reliable of such traces "do not reach back to more than 5,000 to 7,000 years ago."*

* "Present Conflict," page 240.

It may well be that man may have been longer upon the earth than such figures would indicate; but at present, his "antiquity," like his "derivation," if taken from a purely scientific view, is one of the unsolved problems. We do well to interpret our Bibles carefully with respect to this subject. We do well to keep all the doors open, as far as we consistently can, so as to admit into our interpretation all the possible results of any future investigation. But it would be very difficult to show, in the present state of our knowledge, that, so far as the antiquity of our race is concerned, the chronological date in our reference Bibles is so very far out of the way, or that man appeared on the earth very much before "4004 B. C."

CHAPTER LVII.

THE SEVENTH DAY.

WE have gone through the six creative days, and it now remains only to notice the day of rest. This was the seventh day, and the record in regard to it is: "Thus the heavens and the earth were finished, and all the host of them; and on the seventh day God ended his work which he had made; and he rested on the seventh day from all his work which he had made; and God blessed the seventh day and sanctified it, because that on it he had rested from all his work which God created and made."* The creative work has reached a state of completeness. It is "finished," "ended," and a rest-period begins. Those vast secular changes which characterized former ages occur no more. The successive forms of life have reached their culmination in man, and there the line is brought to an abrupt termination. Up to this point, our world was subjected to successive impacts of creative energy, ever crowding it toward a more completed condition; but here it all ends. Not disturbance, but quiet, is the order of things now; not the production of new forms of life, but the continuance and cultivation of those already in existence.

* Gen. ii. 1-3.

This rest follows close upon the creation of man. It is the characteristic of the human period in geological history as of no previous age. The great changes in the crust of the globe, the subsidence of the continents, and the upheaval of mountain ranges, now measurably cease. There are slow oscillations of level yet going forward, but they are so quiet as to be scarcely distinguishable; and there are local disturbances, such as here and there an earthquake or a volcanic eruption; but, for the most part, the earth-crust lies steady beneath our feet. Nature is uniform. Our planet is at rest. Man needs a stable condition of things where he shall dwell; and, with the exception of a single general cataclysm, known as "the flood," there has been no wide-spread disturbance in our planet since his day began.

It is no wonder that the inspired writer takes notice of this circumstance, for it stands in strong contrast with what goes before. The successive types of life which appeared during the long ages of protozoic and mesozoic and tertiary time, form one vast procession. In the vegetable kingdom, they march in upon our world in such divisions as the acrogens and the cycads, the palms and the angiosperms. In the animal kingdom, the family of the mollusks appears, and, following hard after them, the great procession of the articulates. Then the vertebrates file down upon the open area, under such divisions as the fish, the reptiles, and the birds; and last of all comes the enormous army of the mammalia, with their king and ruler, man. So swarm in these new life-forms, the crust of the globe meanwhile sinking under the seas, or lifting its dripping continents from their briny plunge-bath;

while at one era the internal fires belch out, and at another, glaciers a mile in thickness press down from either pole. So it went on, till man appeared, when obedient Nature, recognizing her lord, at once grew quiet, and ever since there has been a great calm.

It is an admitted fact that, so far as is known, no new type of life has appeared, no continent been created, no mountain-range upheaved, and no great tract of country destroyed, since the human era was inaugurated. The old life-processes continue, existing types reproduce themselves with certain closely restricted variations, but that is all. So far as creation is concerned, science fully confirms the Mosaic record, and says that here "God rested from all his work which he had created and made."

How Moses should have been able so accurately to mark the period at which this rest-day began, must forever be a mystery to any person who denies that he wrote by inspiration of God. Moses had no geological system to guide him ; and there was no possible reason why, if he invented his story, he should not have reversed the order of creation, instead of putting it as he did. It was just as natural to suppose that man was created first as that he was created last. It was quite as natural to say that, as the other creatures were made for him, so, like the woman, they were created after him, as it was to say that they all came before him ; but not so did Moses state the case. A long ascending scale of animal life, he says, and at the end, man. Then creation is arrested, the earth quieted, and order reigns. So he tells his story, and so we find the case to have been.

God makes both his working and his resting a pattern

for us. We need to have something to do, and he puts us in circumstances to demand exertion, and says, "Six days shalt thou labor." We need, after exertion, to cease from toil awhile, and he gives us one day in seven as a Sabbath, and says, "In it thou shalt not do any work." The rest-time does not need to equal the work-time; and so he tells us to take six work-days to one Sabbath; for, so Moses says God did when he made the world. And, even for purely secular purposes, we find our rest day as valuable as any day of the seven. We need such a day for physical recuperation; we shall live longer and live more happily; we shall accomplish more and do it more easily, to take six days of work to one of rest.

For spiritual purposes our rest day is above all important. It commemorates the original creation of matter and life. Under Christian arrangements it celebrates that higher creation which was completed in the resurrection of our Lord, and which brings in the "new heavens and the new earth." It is a constant reminder to us of that spiritual element which God breathed into man, and which needs diligent culture and care. This day, coming to us by God's appointment, once each week, says, "You have a nature which the other creatures have not; you have necessities to which they are strangers, and you are marked for a destiny to which they can never aspire." This day, well used, gives us the opportunity for consecrating our social powers to a spiritual end, by coming together as congregations, to worship God. Having rest from worldly care on this day, we can surrender our minds to meditation upon divine things. It is a day on which we receive much instruction, and to which we largely

owe our knowledge of God and of his Book ; and, under that mantle of holy light which sometimes falls upon us on that day, and amid the solemn stillness to which the world is hushed, voices and visions are borne to us from the great hereafter, and we ripen for the "rest that remaineth for the people of God."

Some of the early institutions set up among men may outlive their usefulness and pass away. Some such arrangements are distinctly designated as transient in the writings of Moses, and of the other Old Testament saints. But this day of rest, this Sabbath of the Lord, will be needed for man while man makes this world his home ; and, like its ante-type, the glorious heaven, it has been constituted that, at least for human time, it shall "never pass away."

CHAPTER LVIII.

A RESUMÉ.

WE are now in a position to answer the question with which we started, Does the ancient document agree with the record in the rocks? We have seen what the Story of Creation is, as Moses gives it; and we have seen what the facts of the case are, as science declares them, and thus are able to say whether the story conflicts with the reality, or whether it marvelously foreshadows all that science has discovered on this field. That there should remain some points in which the harmony of the two records can not yet be made out, will not be thought strange; but that in all their leading particulars, the story from Moses and the story from the rocks agree, would seem to have been put beyond all fair question, and this volume will be fitly concluded by placing some of these points of agreement side by side:—

1. According to Moses, nature had a beginning; and, according to the record in the rocks, each life-form had a beginning, and every existing thing looks backward in the same direction.

2. According to Moses, matter was at first formless, void, dark, chaotic; and it is now generally agreed that all matter was originally nebulous, while certainly it

must be admitted that our own planet at least was once in a confused and chaotic condition.

3. Moses represents that the Spirit of God moved upon this formless waste ; and we are quite certain that something has set matter everywhere in motion.

4. Moses represents this moving as a kind of incubation, and says that it was followed by light ; and we know that by some process, not only has motion been imparted to matter, but it has also received such qualities as electricity, chemical affinity, and gravitation, which, with motion, would soon create light in a nebulous body.

5. Moses puts the creation of light before the appearance of the sun ; and in this luminous nebula we find his words made good, for it was light long before the sun was formed ; or, if we suppose that he is speaking of our planet exclusively, it is easy to point to a time when for ages there must have been light here, though no sun was to be seen.

6. Moses says that God made an expanse ; and when the original nebula broke up, wide expanses were opened ; or, if we suppose that by the expanse he means the sky, he uses the right term to designate it, though till long after his day men thought it a "firmament."

7. Moses does not at first call the expanse "good ;" and, if he refers to the atmosphere, it was not good, but as first formed was reeking with deadly vapors.

8. Moses teaches that before life appeared our globe was covered with water ; and no scientific man doubts that there was a primitive universal ocean.

9. Moses marks an era of the appearance of dry land ; and geology tells us of the uplifting of the continents.

10. Moses calls all those early waters "seas;" and the water from which the continents were lifted was neither lake nor river, but sea.

11. On the day when dry land appeared, says Moses, "the earth brought forth grass;" and the indications of life begin in just that early age.

12. Moses puts vegetable life before animal life; and the geologists all agree that so it undoubtedly was.

13. Moses gives an ascending scale of vegetation, culminating in "fruit trees;" and the geological record runs up from the sea-weeds to the angiosperms.

14. Moses states that next after vegetation began, the sun appeared; and scientific men hold that soon after vegetation sprang up, the earth's photosphere passed away, showing the sun and sky; some, however, refer this change to a clearing up epoch after an age of warm, moist, cloudy weather.

15. Moses says that animal life appeared first in the waters; and geology shows that all early life was marine.

16. Moses calls those early creatures "spawners;" and geology shows that such creatures were amazingly fruitful.

17. At a later stage Moses shows us the tanninim, or long-drawn creature; and this well describes the Saurian race of the Mesozoic ages.

18. Moses connects reptilian life with that of the flying creature; and some of those reptiles not only got to themselves wings, but produced quills upon their tails, while bird-life was in the same age abundant.

19. The last great life epoch is designated by Moses, mammalian; and mammalian life characterizes Neozoic time.

20. Though man is a mammal, Moses makes a break in the story between the mammals and man; and that break exactly matches the great ice age.

21. Man's creation finished the six days' work, and God rested; and since the human era began, the earth has been quiet and no further forms of life have appeared.

22. Man, according to Moses, was first located in the region of the Euphrates; and from some centre in Western Asia, all the races have spread abroad.

23. Moses describes the original home of our first parents as a "garden," or an inclosure, and indicates that it was a pleasant place, where several streams were to be found, some of which we cannot now identify; and, if it were some Asiatic Chamouni, some green and sheltered nook, such as often appears in the neighborhood of a melting glacier, the picture would be perfect, streams and all.

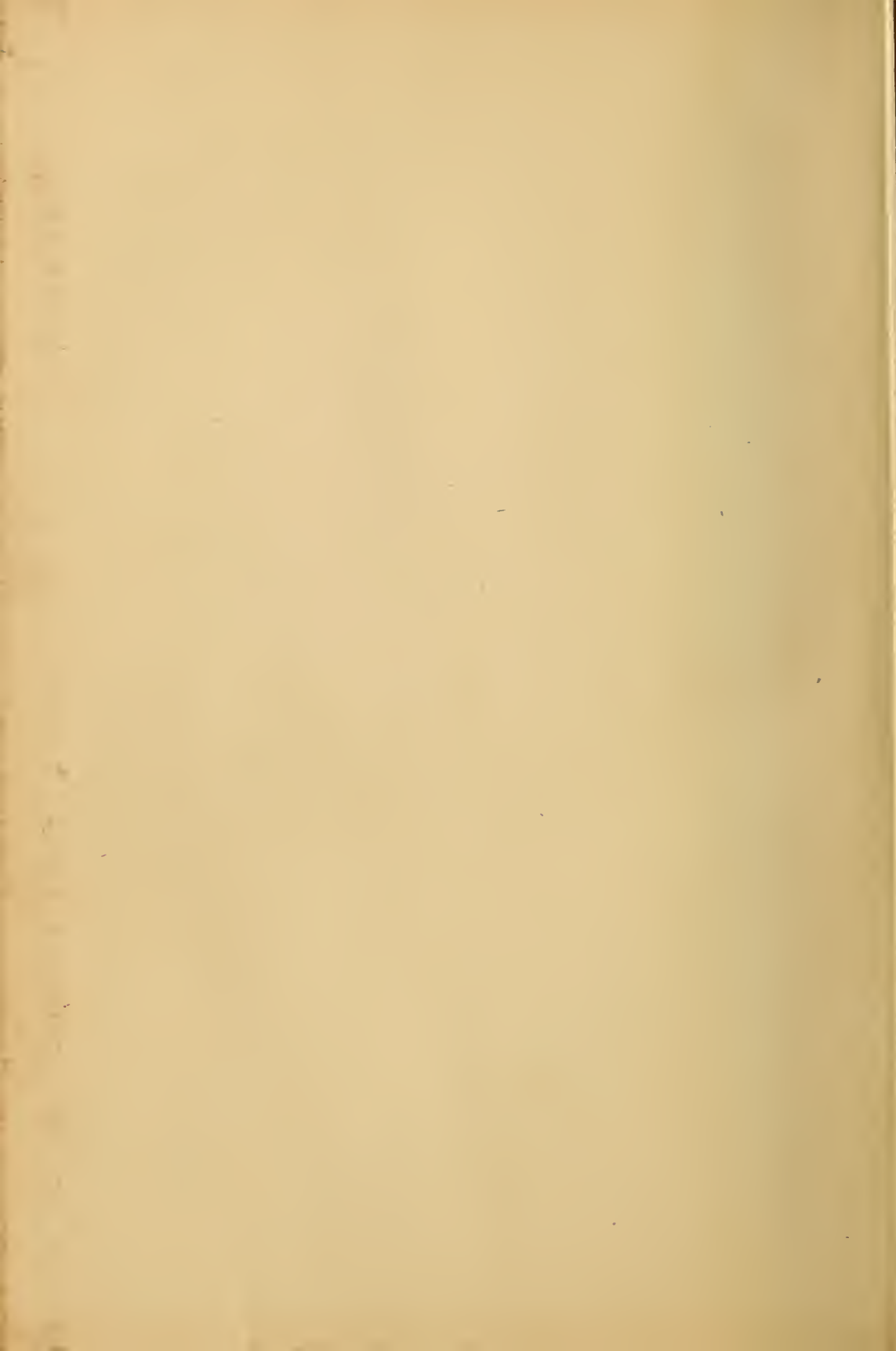
24. Man directly had to leave his garden and encounter a colder climate and a more sterile soil; and there was a cold period, known as the reindeer epoch in palæocosmic times, when the great glacier most likely crowded down into some of the green valleys, and when man suffered from the rigor of the climate.

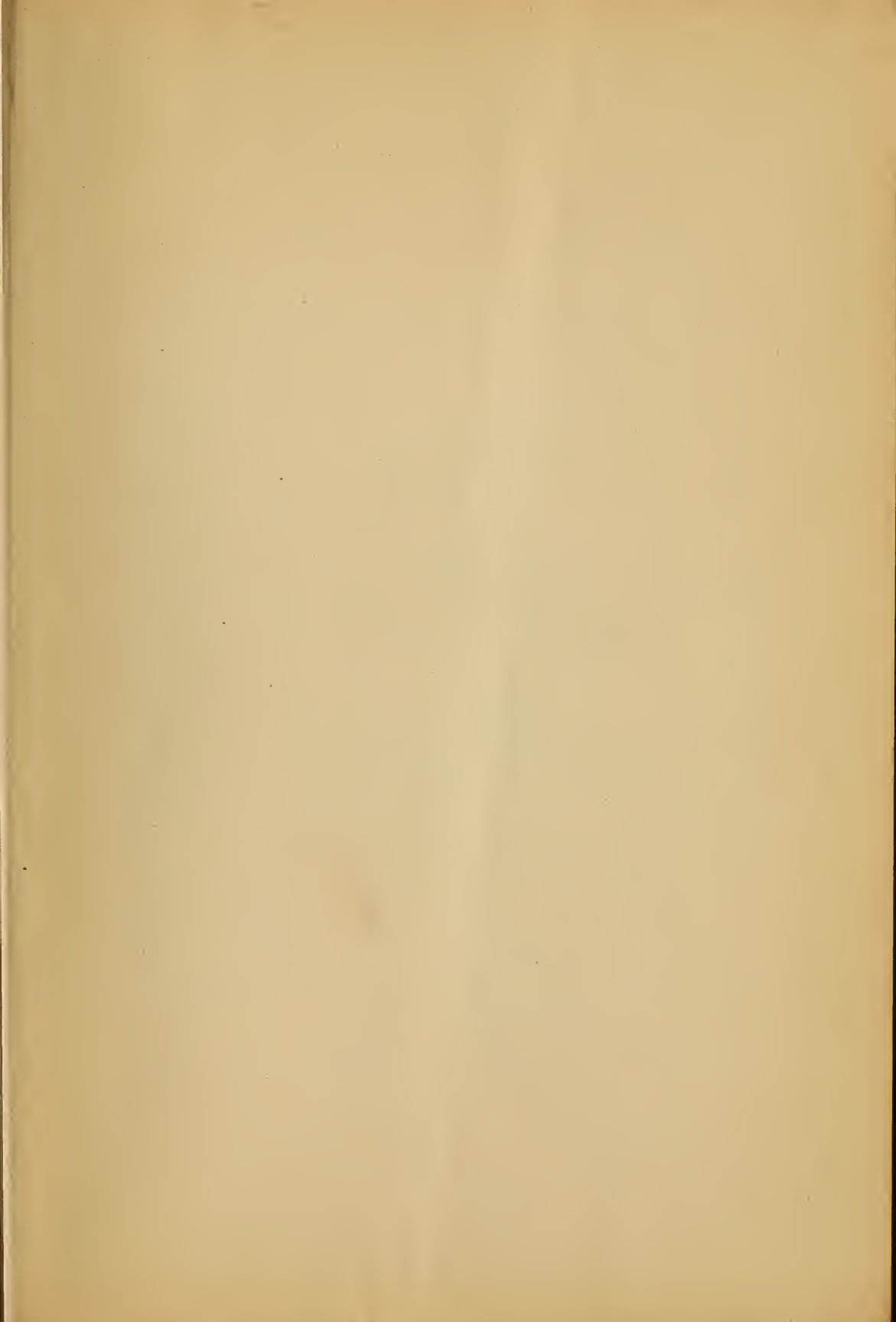
25. Meantime, says Moses, man betook himself, in certain quarters, to rude modes of life, developed great physical strength, became uncontrollably violent, and was swept off by a flood; and the remains of palæocosmic men are found in caves that have been "flooded," and in situations and surroundings indicating amazing strength, large stature, and a rude and violent life; while it is generally agreed that since the glacial period the continents have had one short dip under the sea.

Here are twenty-five particulars, constituting an outline of the Story of Creation ; and in all these particulars the Mosaic record and the rock record read singularly alike. Other points of agreement might easily be indicated, but this may well suffice. In one or two instances, the resemblance we have traced may be a mere coincidence, but taking the entire story, the parallel places are too many and too distinctly marked for any mere chance work. When Moses wrote his Story of Creation, he somehow knew "how the worlds were made," and the geologists and archæologists of our day have only succeeded in discovering from nature what this wonderful man gave an account of three thousand years ago.

The conclusion would seem irresistible. Moses wrote his story by inspiration of God.

FINIS.





LIBRARY OF CONGRESS



0 029 822 317 A